Master's Thesis of Forest Science

A study on the retention of forest-related traditional knowledge

- A case of Dengcen village in Guizhou province, southwest China -

산림전통지식의 보전에 관한 연구

- 중국 귀주성 Dengcen마을 사례를 중심으로-

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Abstract

Local communities have relied on traditional knowledge (TK) to manage forests and utilize forest resources for centuries, and the TK helped them keep the capacity of forest ecosystems in providing environmental services. Such forest-related traditional knowledge (FTK) including local peoples' ecological knowledge, culture, religious belief and forest management know-how has been transmitted through generations. Nevertheless, industrialization and scientific development has eroded FTK and its retention is now facing challenges. This study aims to understand the status of FTK retention, and further identify demographic and socio-economic factors that have affected the erosion. For these purposes, the vitality of FTK retained by a local community called Dengcen – which is located in Guizhou province in Southwest China – was measured by utilizing Vitality Index of Traditional Environmental Knowledge (VITEK) method. Besides, one's age, gender, experience of living in urban areas, and education level are indicated as demographic and socio-economic factors influencing FTK erosion. We suggest, to help the FTK to be maintained, FTK education program for young local people and culture-based ecotourism with active involvement of local community should be developed as well.

Keyword: traditional knowledge, indigenous knowledge, forest management, local community, local people, southwest China
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Chapter 1. Introduction

1.1. Research background

Being filled with abundant environmental resources on which humans rely for survival and development, forests have been inseparably linked to human well-being. Human society and forests affect each other in either positive or negative ways(Vogt et al., 2006). Forests provide diverse ecosystem services to human, which has known as supporting services, provisioning services, regulating services and culture services (MEA, 2005). Moreover, forests have effects on human's health. On the contrary, human acquires forest ecosystem services while their activities can indefinitely affect forest ecosystem according to different ways of managing and utilizing forest resources.

Over the course of last few decades, unprecedented global deforestation and forest degradation have been continuing at an alarming pace. As populations increased, demands for food and industrial crops have been growing accordingly, which had directly caused deforestation in many parts of the world as well as widespread forest degradation, leading to a gradual reduction in biodiversity and ecosystem services. In other words, deforestation and forest degradation as two main environmental conflicts during the last 50 years have brought a series of environmental crisis which has been undermining human well-being. From the perspective of environmental anthropology, it is anthropocentrism that motivates human to damage the ecological environment(전경수, 1997).

Against such a backdrop as well as considering the origins of the environmental problems, many questioned whether modern forest science and technologies of resource management, which somehow reflect anthropocentrism, is up to the task of maintaining sustainable forest environments (Parrotta, Youn and Camacho, 2016;

刘金龙, 张明慧, 和志鹏, 谷莘, 2013).

Fortunately, there are other sources of knowledge and wisdom may light our way towards sustainable forest environments. The Millennium Ecosystem Assessment (MA) report which had been published in 2005, had identified traditional environmental knowledge as relevant in addressing the current unsustainable utilization of different categories of ecosystem services (MEA, 2005). Knowledge and practices have been used by local or indigenous communities to manage and utilize forest resources for centuries, without jeopardizing the capacity of forest ecosystems to provide material and non-material services for future generations. Therefore, there is a growing interest in the role of forest-related traditional knowledge (FTK) in ensuring the sustainable utilization and management of ecosystems services (Boafo et al., 2015).

1.2. Conceptual background and definition of forest-related traditional knowledge

The productive skills and knowledge of human being are been directly exposed to the environment (Netting, 1974). Forests as an environment providing human vital resources for survival, such as food, residence, and fuel, had generated human' s life skills and their consciousness towards forest surroundings since remote antiquity. Along with the development of human civilization, forest-dependent local communities had developed their specific know-how to utilize forest resources efficiently and sustainably.

As physical surroundings, forests are closely associated with human's basic necessities of life. Throughout history, there are countless traditional and unique examples of forest resource management. Taking Asia as an example, traditional forestry know-hows are from ancient times utilized by local people from generation to generation. Subsequently, some of these know-hows evolved into forestry norms of the community and sometimes codified by authorities and enforced among people after

institutionalized, similar to what we call forest policy nowadays. Forestry administration in Chinese history was earliest found in Yao and Shun times (2377BC−2178BC)and had been passed down to Qing dynasty (1644AC – 1912AC)(刘胜祥, 胡秀云, 1998). FTK is seen not only in the history of Asia, ancient people lived in other parts of the world, such as South America and Africa, also have a long history of managing forest resources through their traditional know−hows, which are also called “indigenous knowledge” in some research (Boafo et al., 2015; Cooper, 2010).

According to environmental anthropology, forests are not only physical surroundings but also an abstract object of human’s perception when reviewing the history of relationships between forests and human. Forests had been regarded as an abstract subject through human’s imagery. Generally, forests as an abstract object may convert into religious beliefs or even deeper into human’s psychosphere(전경수, 1997). Examples can be seen in the traditions and customs of local communities from different parts of the world. For instance, Bambuti people who live in the Ituri forest, central Africa, consider the forests to be their great provider and believe it is sacred (Crews, 2003). Their most important ritual, which is referred to as “molimo”, is a celebration to wake the forest because they believe that if bad things are happening to them, then the forest must be asleep (Mukenge, 2002; Turnbull, 2015). Similar cases can be found in Asian countries. Since ancient times, local people living in China have their specific totem worship of nature, such as trees, plants, and wildlife(张钧成, 1988). This worship had derived sacred trees, sacred forests, and sacred mountains in the cultures of ethnic groups from different regions of China, such as the Lisu people living in the north section of Gaoligong Mountain (赖庆奎, 刘斌, 陈羞莎, 2013), the Hani people living in the south section of Ailao Mountain (杨京彪, 郭泺, 成功, 薛达元, 2014), Tibetan people, and Zhuang people living in Yunnan province (杨宗亮, 2005; 邹莉, 谢宗强, 欧晓昆, 2005). In China, nature worship is not only seen among common people, it also

occurs within governors of each dynasty (钟年, 1994; 何星亮, 1992). Besides, philosophers from different dynasties in China had raised various philosophies about the relationship between human and nature, particularly forests. The most representative philosophers in nature philosophy are Laozi and Xunzi. Laozi emphasized the harmony between human and nature(齐冬莲, 张敏, 谢翠蓉, 2010), while Xunzi advocated that nature has its own regulation which should not be interfered by human(代峰, 2002).

In summary, FTK includes both physical and abstract component of forests. As those skills and religious beliefs have been developed and passed down through generations, they became a part of traditional knowledge system of any communities. To interpret it in a modern light, FTK is involved in both natural science and social science. Furthermore, it is essential to the study of relationships between forest ecosystems and human society.

Before starting a research on FTK retention, it is necessary to define what FTK is contained within a specific local community. FTK has been supported by and embodied in local languages, culture, beliefs, community laws, and governance systems (John A. Parrotta et al., 2016). The UN Forum on Forests had adopted the widely used definition of traditional ecological knowledge provided by Berkes, Colding and Folke (2000): "...(FTK) is a cumulative body of knowledge, practice, and belief, handed down through generations by cultural transmission and evolving by adaptive processes, about the relationship between living beings (including humans) with one another and with their forest environment".

FTK is most often tightly interwoven with knowledge relevant to livelihoods, land-use practice, culture, religion, customs, and community-level decision-making process associated with forests and the lives of local community (Parrotta et al., 2009; Parrotta and Trosper, 2011). Depending on different natural conditions and humanistic characteristics, contents of FTK can vary from community to community. Despite of the differences of FTK contents between each local community, one common ground should

be stressed that FTK is human wisdom about living with forests in harmony.

1.3. FTK in Asian countries

Asia, a continent with at least 10,000 years of documented history and time-honored wisdom as well as numerous traditional societies consist of diverse ethnic groups, is characterized by a rich cultural diversity. Forests of this region, as a hotspot of biodiversity, have been sustainably managed by specific approaches of local communities who are ethnically and culturally differ from each other. Having evolved over many centuries in various environmental conditions that accompanied by diverse socio-economic and cultural structure (Parrotta and Trosper, 2011), FTK in Asia embodies traditional culture, religion, livelihood, and social regulation of every traditional community.

FTK in Asia includes cultivation of plants, agroforestry, forest management and resource utilization practices, community regulation, traditional culture, and religious belief related to forests. When reviewing the forestry history of Asian countries, FTK is seen playing important role in the conservation of forest resources. It has been discussed by some case studies in Asia, for example, the case of Aka tribes of Arunachal Pradesh, India (Nimachow, Joshi and Dai, 2011). Moreover, it is indicated that FTK is vital in local people's livelihood according to previous research of FTK. To emphasize the far-reaching significance of FTK, a brief introduction of FTK in Asian countries is necessary with focus on two aspects: traditional beliefs and forest management practices, and traditional technological practices.

1.3.1. Traditional beliefs and forest management practices

As mentioned above, many local people in Asia hold cultural and religious beliefs related to forests. Those beliefs, as well as the customary institutions associated with them, are believed to conducive to forest conservation.

Among forest-dependent local communities in Asia, specific woodland or certain tree species are considered as a sort of connection with their ancestors, God, or tutelary deity according to those traditional religious beliefs. This kind of forest and trees are commonly called 'sacred forest' and 'sacred tree' by scholars. For example, local people live in Kumaun Himalaya, India, consider big and old trees of Surain (*Abies pindrow*) as sacred and commonly construct small temples or worship places nearby (Farooquee, Majila and Kala, 2004). In Cordillera, Philippines, some sacred trees such as balete trees (*Ficus elastica* and *Ficus subcordata*) and some water-baring tree species are protected by local people as they believe that these trees are associated with spirits. In southern China, Fengshui forests are popular among not only the ethnic minorities but also traditional communities in rural areas as people believe that holy spirits contained in Fengshui forests can protect the village and maintain the harmony (Teather and Chow, 2000; Yuan and Liu, 2009).

Showing respect to their sacred forest, local communities developed their own rules to preserve sacred forest by restricting their forestry activities in certain areas or during certain times of a year (古开弼, 2004). Consequently, sacred forests are relatively well-preserved when comparing to other types of forested areas (施晓春, 周鸿, 2003). Most of those rules had transmitted orally and evolved into customary forest regulations through generations for not only the sacred forest but also common forest resources of local communities. Customary forest regulations among forest-dependent communities play an important role in regulating forest management. For example, Kenyah people live in East Kalimantan, Indonesia have developed regulations (*hokum adat*) for the management of timber and non-timber products (Sirait, Prasodjo, Podger, Flavelle and Fox, 1994). In Rajasthan, India, institutionalized rules and regulations for khejri (*Prosopis cineraria*) forests dominated by the value system of the Bishnois sect has resulted in productive, species-rich cultural landscapes

(Ramakrishnan et al., 2011). Similarly, customary forest regulations have prevailed in many local communities in northeast Asia such as China, Korea, and Japan. Village regulations are commonly seen among ethnic minorities in southwest China. For instance, Yi people living in Nanhua County, Yunnan province have well-enforced village regulation for forest management according to Liu, Zhang, and Zhang (2012). In South Korea, Songgye, a traditional method of forest management evolved in later half of Choson Dynasty (1392AC-1910AC), is indicated having contributed to the successful reforestation event occurred in South Korea during the late-1960s to the late-1980s (Chun and Tak, 2009).

1.3.2. Traditional technological practices

Local people of Asian countries have diverse traditional know-hows for managing and utilizing forest resources. According to Parrotta and Trosper (2011), these traditional know-hows developed by local people in Asia can be classified based on their usage in forestry activities such as traditional practices for timber and non-timber forest products, traditional practices for agroforestry, traditional practices for shifting cultivation, etc. Traditional ecological knowledge of Dayak Tujung communities in East Borneo, Indonesia is one of the examples of the interrelation between agriculture, forest management and local culture (Siahaya et al., 2016). Taking China as an example, Chinese people have been using medicinal plants, which are commonly known as herbs, for curing disease since thousands of years ago. This traditional technological practice had contributed to traditional Chinese medicine which is essential in traditional Chinese cultural system. In the mountain areas of South Korea, people nowadays plant maple trees in order to tap the sap from them. This technological practice that inherited from their ancestors has been bringing income to local people in present days (Youn, 2009).

1.4. Challenges facing FTK in Asia

In spite of the fact that FTK has created diverse forest management practices which have been sustaining local communities' food security, health, and cultural traditions (Berkes, 2012), FTK is fast disappearing in most Asian countries (Parrotta et al., 2009). According to Molintas (2004), the majority of local communities are struggling by losing of their FTKs, which including their vernacular languages, traditional institutions, cultural and religious practices, local peoples' self-identification as distinct societies, and special relationship with their ancestral land. The negative impact of the decline of FTK on livelihoods, culture, biodiversity, as well as the capacity of forest ecosystem of providing environmental services, is evident in most forest-dependent communities of Asia.

Many causes are blamed for being accountable for the general erosion of FTK throughout Asia. According to Youn et al. (2011), FTK has the vulnerability to rapid social changes and to outside development intervention. Impacts of modernization, together with industrialization, urbanization, modern education, and globalized market economy, are recently discussed by scholars. Nevertheless, reasons of FTK erosion remain poorly understood due to the deficiency of FTK research worldwide as FTK is unappreciated and undervalued by general public for long.

Traditional ecological knowledge (TEK), of which FTK is a part, had earliest raised concern through the Convention on Biodiversity (CBD) in 1992. Some Asian countries have been seeking for effective ways to conserve domestic genetic resources and the relevant traditional knowledge since the CBD has been signed(Krishna et al., 2014). One significant effort was in the early 21st century that the ASEAN Framework Agreement on Access to Biological and Genetic Resources was drafted in 2000 to protect their TEK and to make better use of it (Z. Cheng, 2006). One of the members of ASEAN, Thailand, had included laws of intellectual

property protection of Thai traditional medicine into constitution (Kong and Yu, 2009).

For the International Union of Forest Research Organization's (IUFRO) Task Force on Traditional Forest Knowledge, several international conferences were convened in Asian countries between 2005–2010 (Parotta, Liu and Sim, 2008) and special issues were published. Scholars and policy-makers began to show their interests in FTK research during the first decade of the 2000s, in particular, since Nagoya Protocol on Access and Benefit Sharing (ABS) was adopted in 2010 (Cheng, Wang and Xue, 2012). Although scientists have made some contributions to FTK research, however, FTK research in Asia is still at an early stage.

As a country abundant in FTK and now undergoing modernization accompanied by rapid social changes, China is one of the hotspots of FTK research. To understand the impact of policy reform and social changes on FTK as well as people who rely on it, scientists had conducted a survey in Yi community in Yunnan province, southwest China (Liu et al., 2012). According to this research: "FTK appears to be vulnerable to government policy interventions, the expansion of increasingly globalized market economies, and declining interest in traditional wisdom, knowledge, and lifestyles among younger generations". In the same province, some scientists had attempted to explore the state of retention of TEK under the Hani Rice Terrace System (Z. Yuan et al., 2014). Results of this research demonstrated that TEK of target community is significantly declining within generations. Similarly in other case studies, FTK in Chinese rural area is also indicated rapidly-vanishing. Nevertheless, FTK research in China is far from enough when considering the challenges now facing FTK among local communities.

1.5. Research questions and objective

Being aware of the importance of studying FTK as well as the challenge facing it, this paper especially attempts to answer three

research questions. 1) What are the status and trends of FTK retained by local communities in China? 2) What are the factors that might have affected FTK in China? 3) What makes the retention of FTK possible in China?

Based on these research questions, this study aims to understand the status and trends of FTK retained by target community using quantitative and locally appropriate methods. Besides, this study tries to identify demographic and socio-economic factors might have affected FTK, and also discuss the solutions for FTK retention in the target community. Last but not least, once the erosion of FTK will have been demonstrated, measures that may preserve and revive FTK would be provided in this study.

Chapter 2. Methodology

2.1. Research framework

2.1.1. Conceptual framework

There are two general concepts of environment used by anthropologists. One is narrower, in which environment means the natural world, and relationships between human and environment are so-called "culture". Environment in this concept is considered as a "biophysical world" while the broader concept of environment regards it as a "psychosocial world". Environment in the psychosocial concept consists of society, culture, and nature, as well as relationships between these objects and those who have the perception of them. However, these two different concepts of environment which interpret natural science and social science are not independent or exclusive. Since last few decades, in order to solve pressing social and environmental problems, scholars from diverse fields such as ecology, anthropology, economy, and even policy-making have been making contributions to integrating biophysical and psychosocial concepts of environment in one framework, or system. The progress of integrative approaches, for instance, the "socio-natural system" (Bennett, 1976) have motivated the rise of several subfields associated with the social sciences and natural sciences. Environmental ethics, ecological economics, and traditional ecological knowledge are some representative examples under the development of socio-ecological systems. As a branch of the traditional ecological knowledge system, FTK embodies interactions of natural sciences and social sciences. Being involved in either natural environment or social environment, humans have been maintaining elaborate relationships with every object from these two domains. Complicated interactions between human activities and those objects can be summarized as

“effect” and “adaptation” according to ecological anthropology perspectives (전경수, 1997). Owing to these “effect” and “adaptation”, the environment has been sustaining itself as an all-inclusive dynamic system (Figure 1). As one of the outcomes from such a system, FTK is generated from human’s perception and activities towards forests.

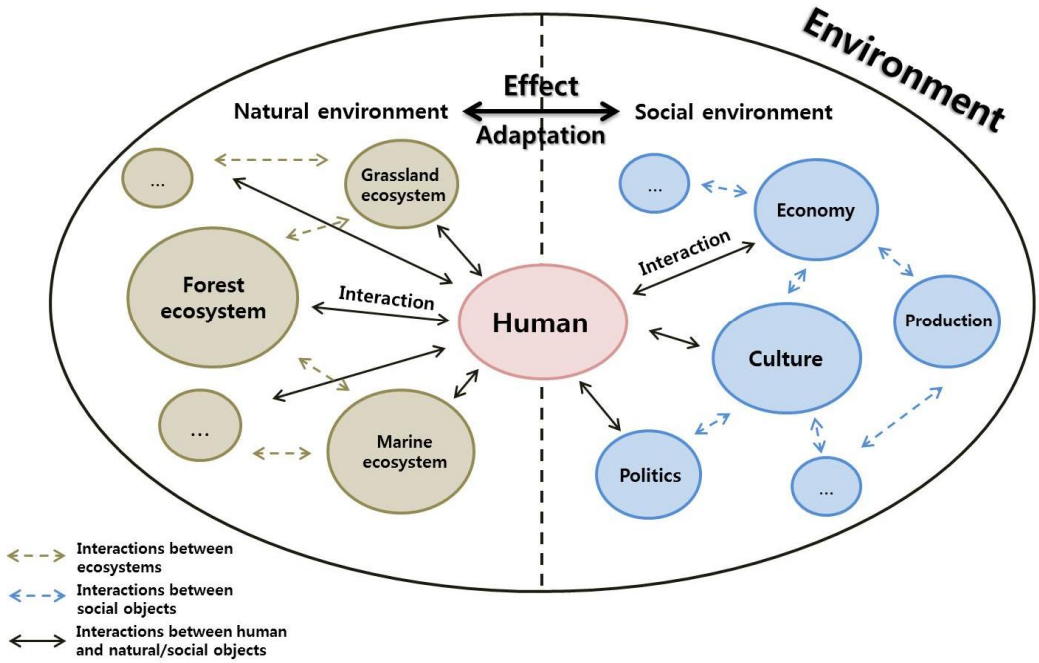


Figure 1 A conceptual framework of environment and relationships between natural and social environment

Ideas of environmental anthropology that forests are not only physical surroundings but also abstract object in human’s perception is emphasized when focusing on the relationship between human and forests (Figure 2). As a physical object, forests include elements of forest ecosystem which belong to lithosphere, hydrosphere, aerosphere, or biosphere. Meanwhile, human abstract this physical object as their own awareness, which is commonly presented as cultures, customs and religious beliefs. Based on the relationship between human and forests, contents of FTK can be defined and categorized.

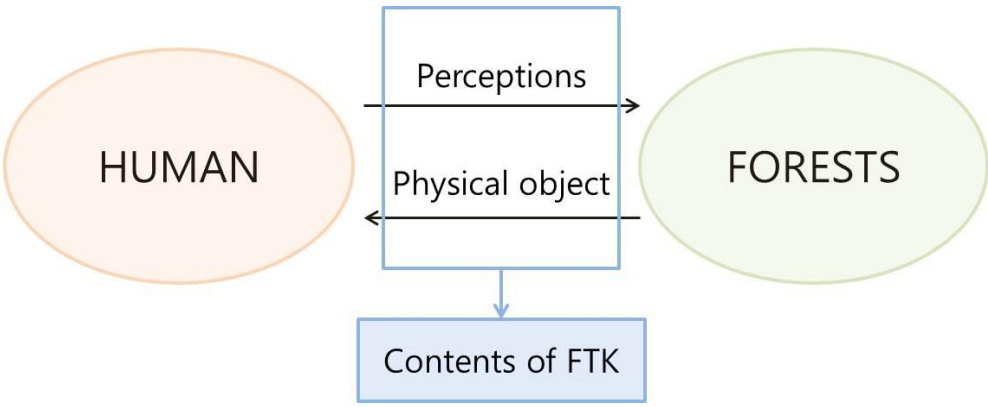


Figure 2 Relationship between human and forests on the perspective of environmental anthropology

2.1.2. Empirical framework

There are three research questions of this study. 1) What are the status and trends of FTK retained by local communities in China? 2) What are the factors that might have affected retention of FTK in China? 3) What makes the retention of FTK possible in China? To answer these questions, several hypotheses were raised and an empirical framework was built and illustrated in Figure 3.

Explanatory variables of TEK variation and change are interpreted as age, gender, language shift, formal education, market integration, western medicines, habitat degradation, migration, and values change by Stanford Zent and Maffi (2009). In addition, there was one research conducted in a local community in Yunnan province, China (Z. Yuan et al., 2014), in which erosion of TEK was attributed to the factors of age, gender, education, and profession. Learning from previous research, as well as considering the social situations of rural areas in southwest China, research hypotheses are as below. 1) FTK has eroded with the passing of generation in local communities. 2) There are differences of FTK retention between male and female. 3) FTK retention between people who have experience of living in urban areas and those who have never left rural areas varies. 4) One's education level may affect FTK retention.

To verify the first hypothesis, an experimental methodology

called “Vitality Index of Traditional Environmental/Ecological Knowledge” (VITEK) that measures the current status and changes of traditional environmental /ecological knowledge itself was used to measure the retention rates of FTK.

To verify the other hypotheses assuming gender, the experience of urban life and education level are demographic and socio-economic factors influencing FTK retention, statistical analysis is conducted after VITEK statistics are calculated.

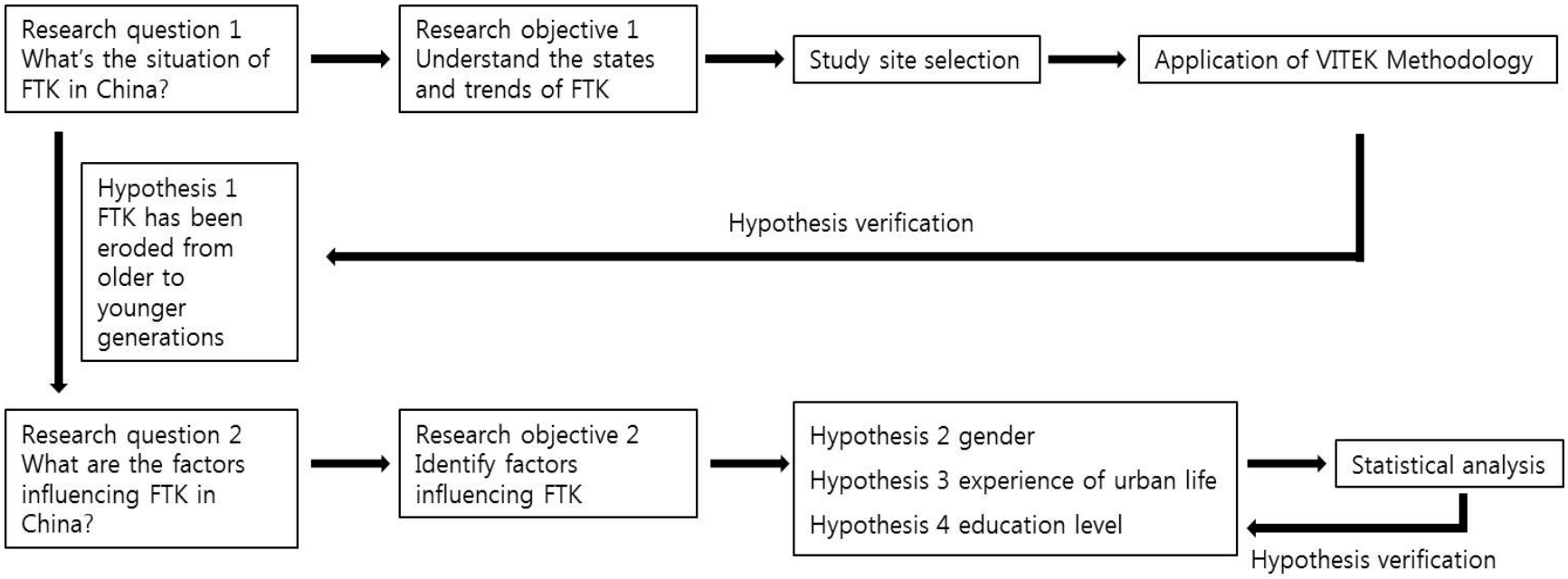


Figure 3 An empirical framework of study on the retention of FTK

2.2. Application of VITEK methodology

VITEK is a tool for measuring the retention and change of TEK developed by ethnobiologist from Terralingua – a non–governmental organization (NGO) that works to sustain the biocultural diversity. In this study, a field survey was conducted following the steps and core contents of the VITEK manual provided by Terralingua (Zent and Maffi, 2012), with some adaptation under local condition. Once the FTK local domains are defined, FTK aptitude test (FTKAT) is developed up in the field according to the FTK local domains. Respondents who are taking the test are stratified minimally by their age and gender.

2.2.1. Defining local FTK system

Generally speaking, FTK contains two components. One is conceptual, ideological, and usually non–material while another is practical and material. This classification of FTK contents can be supported by the conceptual background and conceptual framework of FTK that mentioned above. In fact, preselected list of cosmopolitan domains provided by VITEK (Zent and Maffi, 2012) also divided FTK into conceptual knowledge component and practical skills component. According to the VITEK methodology, these components can further divide into different categories, which are flexible and locally appropriate, layered as the primary domain, secondary domain, and tertiary domain.

2.2.2. Division of age cohort

When applying VITEK methodology, one critical step is to determine the division of age cohort of selected respondents. Division of age cohort recommended by Zent and Maffi (2012)is a standard generation interval size of 25 years, which is always used by archaeologists with respect to prehistorical modern human populations(Zent and Maffi, 2012). However, considering the complicated social changes in China, as well as the hypotheses of

factors influencing FTK retention, it is better to divide the age cohort by a more appropriate approach. J. Yuan and Niehof (2011) had divided the age cohort based on the year of the founding of the household in their research on agricultural technology extension and adoption in China, which had decided the household's various experiences of agricultural technology extension. Being inspired by J. Yuan and Niehof (2011), the interval size of each age cohort in this study is decided according to several historic events of modern China (Table 1). Within these events, there are two turning points of socio-economic development of China. One is the establishment of People' s Republic of China (PRC); the other is the Chinese Economic Reform. Before 1949, Republic of China (1912 - 1949) was struggling against warfare for decades. Neither political environment nor economic climate was steady. Social system tended to be stable after the establishment of PRC, however, during the early days of PRC, people, as well as their livelihoods, had suffered a lot from either political turmoil or natural disaster until the economic reform was eventually implemented in 1978.

Table 1 Historic events of modern China

Year	Historic events
1937 - 1945	Second Sino-Japanese War
1946 - 1949	Chinese Civil Wars
1949	Establishment of PRC
1958 - 1960	the Great Leap Forward
1959 - 1961	The Great Chinese Famine
1966 - 1976	Chinese Cultural Revolution
1978	Chinese Economic Reform

Taking these two turning points as the baseline, respondents can be divided into three age cohorts (Table 2) with equal populations. Respondents belong to the oldest generation was born before the establishment of PRC in 1949. The youngest

respondents were born after the Economic Reform which had been implemented at the end of the 1970s. At the meanwhile, individuals younger than 15, which is the age that considered as intellectually not yet mature, are eliminated from consideration for the sample selection. Similarly, it may not be feasible to find enough individuals older than 80 or age-dependent decline of physical/mental health may make it difficult to achieve meaningful results through the test. Therefore, the cutoff age of this study is 15 and 80 years old. Within each age cohort, the population of male and female respondents should be equal as well.

Table 2 Age cohorts of respondents

Age Cohort	Year of Birth
The oldest generation	1920s –1940s (no older than 80)
Middle generation	1950s – 1970s
The youngest generation	1980s – 2000s (no younger than 15)

2.2.3. FTK aptitude test

Based on the local domains, FTKAT is divided into conceptual knowledge component (CK) and practical skills component (PS) which is consisted of 70 questions with total 100 points. Both male and female respondents answer exactly same questions for CK component. Differently, questions of PS component are set respectively for male and female respondents since they do not possess same categories of FTK.

2.2.3.1. Conceptual knowledge component

37 questions constructed CK component with total 40 points, in which respondents were given true/false or multiple choice questions. In the case of true/false question, only when respondent answers correctly can he/she get 1 point. If one answers a wrong

answer, his/her responses were given value point of zero. The scoring of multiple choice questions is slightly different. On one hand, some of these questions have single correct answer making its scoring system works same as that in true/false questions. On the other hand, for some questions, respondent gets more or fewer points according to the different grading of each answer. Respondents can never get points with a “do not know” answer.

2.2.3.2. Practical skills component

The PS component is a little bit different. Instead of true/false questions, respondents were given multiple choice questions and self-reporting questions with some sort of follow-up verification query, which means that more details are needed from respondent to estimate how well he/she know or practice the skill. Tests for either male or female respondents consist of 33 questions, covering different FTK categories that men and women respectively acquire. In this component, respondents were encouraged to describe more details. The more comprehensive the respondent answers, the higher points can he/she get. For example, when conducting the test to a female respondent with a question from “weaving cotton cloth” category, the question should be: “Have you ever weaved cotton cloth?” If the answer is “yes”, ask her “how often do you weave cotton cloth?” (Appendix I) Scoring of this question is divided into three levels: 2 points for the answer of “I often weave cotton cloth”, 1 point for the answer of “I rarely weave cotton cloth”, and 0 points for the answer of “No, I cannot weave cotton cloth” or “do not know” answer. For most questions of PS components this scoring method was used.

2.3. Study area

2.3.1 FTK in China and Guizhou Province

Being emerged as one of the world's earliest civilizations, evidence of human accessing to forest resources in China can be found ever since Peking man has existed roughly 750,000 years ago. In addition to long history, China's climate and landscapes vary significantly from region to region because of its complex topography and vast width. China is home to innumerable species of creatures and a variety of forest types, making it the most biodiverse country in each category outside ofthe tropics. People from different ethnic groups have been living on this land since ancient China and have created China's cultural diversity. Nowadays, China officially recognizes 56 distinct ethnic groups of which 55 ethnic groups called "ethnic minorities" comparing with Han Chinese. These ethnic groups, with unique characteristics and diverse culture, have been possessing abundant FTK through their daily life.

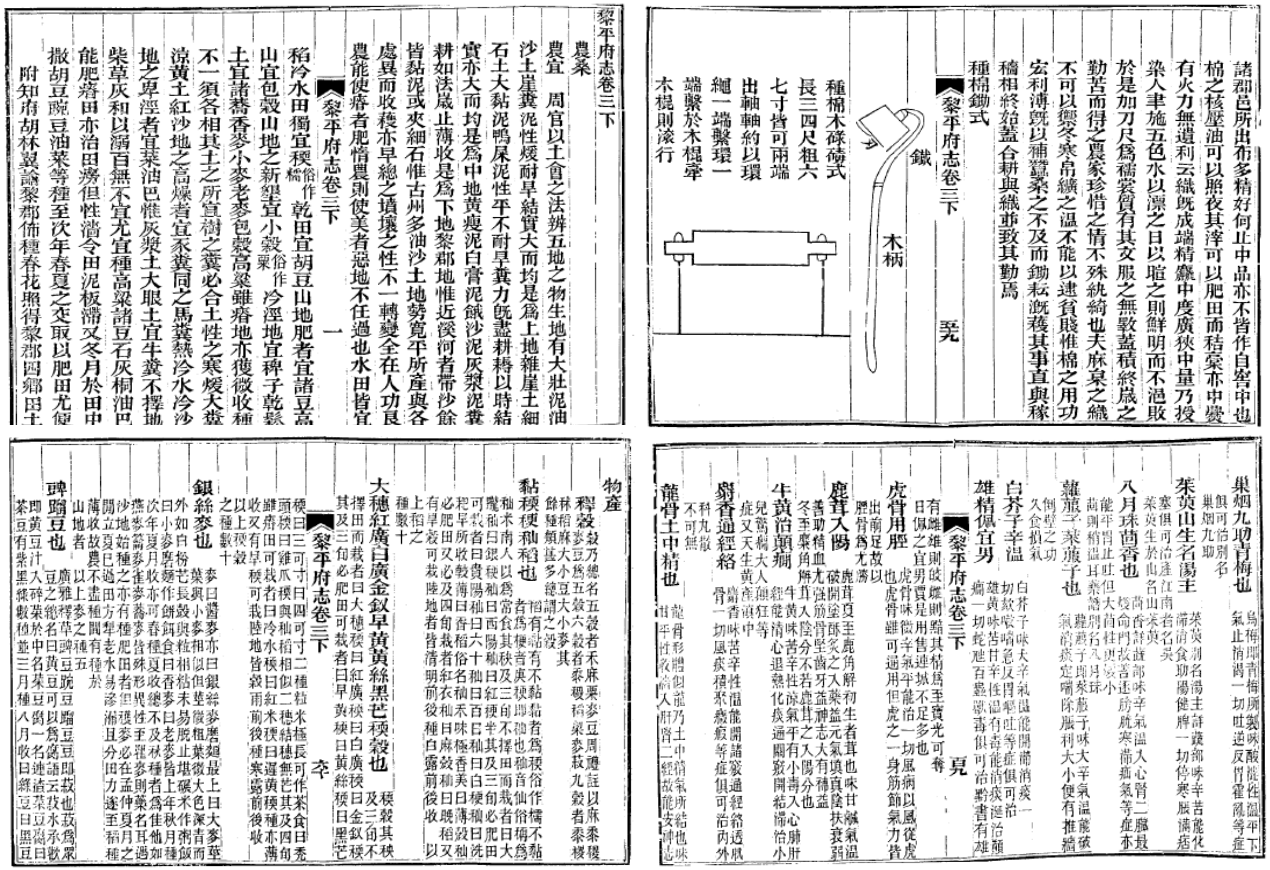
Figure 4 The region of Southwest China in map
(Citing source: https://en.wikipedia.org/wiki/Southwest_China)

Southwest China, including the municipality of Chongqing, the provinces of Sichuan, Yunnan and Guizhou, and the Tibet Autonomous Region (Figure 4), is one of the densest regions with diverse ethnic groups in China with almost 0.2 billion resident population.

It covers 78° 25' – 110° 11'E, 25° 03' – 36° 53'N with a large area of 2.5 million km^2. Geographically, Southwest China is consists of several geomorphic units such as Bashu Basin, Yungui Plateau, and Qinling – Bashan Mountian Area.

Figure 5 Guizhou Province in map
(Citing source: http://www.map-china.com/guizhou-s-ow.shtml.htm)

One of the provinces lies at Yungui Plateau, Guizhou, is a cradle of human civilization where Paleolithic civilization had been found. Moreover, thanks to the subtropical humid climate and the terrain with altitude difference, Guizhou enjoys abundant forest resources. Owing to the profound culture and diverse biodiversity, evidence of Guizhou people using FTK to manage and utilize forest resources can be easily found as written records. Through a chorography from Guangxu period of Qing Dynasty, telling about historical information and events in Liping County – in where the study site is located – it is found that there has been a fund of FTK recorded by the government. This official document from ancient China, which remains accessible in Library of Liping County, had recorded a few categories of FTK such as the identification of crops, plants, trees and wildlife, the usage of herbal medicine, and the technique of silkworm rearing (Figure 6).



諸郡邑所出布多精好何止中品亦不皆作自窖中也
棉之核壓油可以照夜其滓可以肥田而稭槀亦中爨
有火力無遺利云織既成端精麤中度廣狹中量乃授
染人聿施五色水以濃之日以暄之則鮮明而不浥敗
於是加刀尺爲褊裳貧有其衣服之無斁蓋積終歲之
勤苦而得之裹家珍惜之情不殊紈綺也夫麻枲之織
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穡相終始蓋合耕與織事致其勤焉

種棉鋤式

黎平府志卷三下

農桑

農官　周官以土會之法辨五地之物生地有大壯泥油沙土墝黄泥性煖耐旱結實大而均是爲上地雜屋土細石土大黏泥鴨屎泥性平不耐旱糞力既盡耕耨以時結實亦大而均是爲中地黄瘦泥白膏泥鉏沙泥灰漿泥黄耕如法歲止薄收是爲下地黎郡地惟近溪河者帶沙餘皆黏泥或夾細石惟古州多油沙土地勢寬平所産與各處異而收穫亦早總之壤壤之性不一轉變全在人功良農能使瘠者肥惰農剔使美者惡地不任過也水田皆宜

黎平府志卷三下　一

稻冷水田獨宜稷俗作乾田宜胡豆山地肥者宜諸豆嘉俗作粟山宜包穀山地之新墾宜小穀冷溼地宜稗子乾鬆土宜諸薥香麥小麥老麥包穀高粱雖瘠地亦獲微收種不一須各相其土之所宜嘗之糞必合土性之寒煖大蕾涼黄土紅沙地之高燥者宜黍糞同之馬糞熱冷水冷沙地之卑溼者宜菜油巴惟灰漿土大眼土宜牛糞不擇拋柴草灰和以瀦百無不宜尤宜種高粱諸豆石灰桐油巴能肥瘠田亦治田瘠但性濶令田泥板滯又冬月於田中撒胡豆豌豆油菜等種至次年春夏之交取以肥田尤御

附知甫胡林翼論黎郡佈種春花照得黎郡四鄉田土

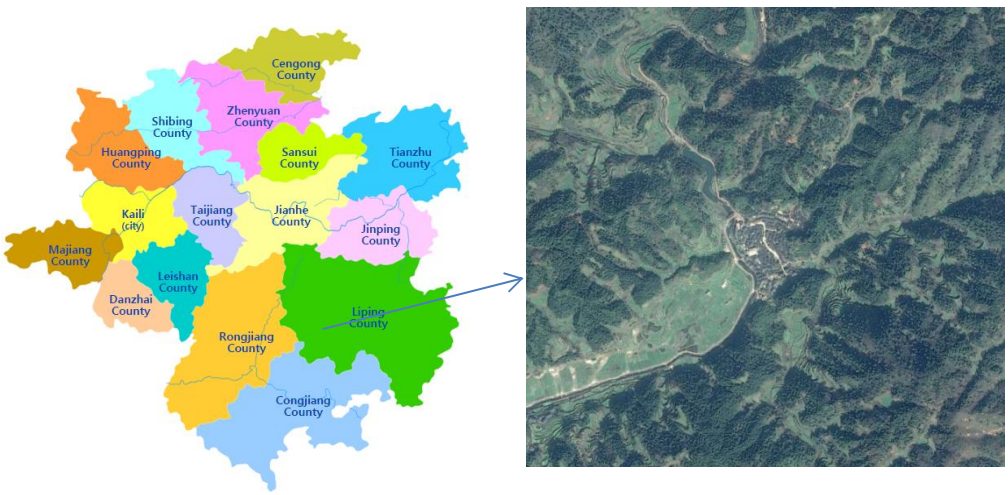
物産

稗穀　穀乃總名五穀者禾麻粟麥豆爲五穀穀者黍稷稻粱菽九穀者黍稷稻粱麻麻大小豆大小麥其餘種類蓋多穀之設

黏稷稷稻也　稻術有赤白二種赤者爲粳白者爲糯粳音庚稷即稌也稌音秫秫田不耐旱糯田兩熟者日早稻日晚稻早稻日紅稻日白稻日秔稻日糊稻日香稻日烏口稻日百日稻日六十稻日雷公稻日麻穀稻日胭脂稻日金釵稻日紅芒稻日烏口稻日百日稻日六十稻日香

2.3.2. Study site

Dengcen Village is located in the southeast of Qiandongnan Miao and Dong Autonomous Prefecture in Guizhou Province (Figure 7), covering 108° 51'−108° 54'E, 26° 10'−26° 13'N. Belonging to Maogong Town of Liping County, Dengcen is a local community of Dong people, which also called "gaeml" in their local language. According to the latest demographic data, Dengcen village has 158 households, about 600 people.



(A) (B)

Figure 7 Map showing study site in relation to the study area (A) Qiandongnan Miao and Dong Autonomous Prefecture in map; (B)The location of Dengcen village

(Citing source: Google Earth)

Dengcen people are all originated from the same family, with their family name "Wu", had divided into three branches later. Tradition says that ancestors of Dengcen people left their original resident to escape the war during Qin and Han Dynasties (221BC – AD220) and finally settled down in where Dengcen is now located after several migrations. As a Dong ethnic community, Dengcen people have a distinct culture and use their vernacular language which created the exclusiveness, centrality, and isolation of the community. Dengcen people's traditions and culture have been

inherited mainly through myths, folktales, Dong opera (yik gaeml) and Dong songs (al laox), passed down through generations orally. Dengcen people believe in the spirits of nature, in particular, they have the worship of forests and trees. This worship significantly represented by their sacred forests, which commonly called Fengshui forests in China.

Benefiting from abundant forest resources, Dengcen people earn their livings by forestry since hundreds of years ago. Throughout the long history of managing and utilizing forest resources, Dengcen people possess systematic traditional knowledge related to forests, which is an outstanding example of humanity's inter-relationship with nature. Similar to other Dong ethnic communities, Dengcen village is also known for their unique Dong ethnic architecture and craft skills, such as making bark papers and weaving rattan basket. In 2012, Dengcen village was officially selected to the first edition of Chinese Traditional Villages Catalog ("Chinese Traditional Villages Catalog," 2012). From then on, Dengcen village has begun to come to light as a tourist attraction.

Dengcen village has pleasant surroundings with hills behind and river in front. Coming down from Houlong Mountain, which is considered as the sacred mountain by Dengcen people, a spring flows out of several hundred-year-old yews *(Taxus baccata)* just greeting in front of the Root Gate –naturally shaped by strong and intertwining roots of two old trees. Entering into the village through the root gate, there is a cluster of hundred-year-old granary which called "sox oux" by local people (Figure 8). Granary is a wooden container for crops like rice, formed like a small house. Traditional granary used by local people has a unique and smart design, with four stilts on the bottom standing in the pool filled with water. It is said that the structure can prevent the crops from fire, mouse, and moisture. A traditional drum tower (Figure 9) with a wooden frame is next to the granaries; inside it, Dong people usually hold meetings or sing and dance together during their leisure time.

Nowadays, young people in Dengcen village more prefers to gather in the playground since the primary school had been shut down years ago caused by the lack of students. Opposite to the school building a stage serves as a venue for Dong opera, one of the traditional entertainments of Dong people. In recent years, villagers hold a gala here when celebrating traditional festivals such as Liuyueliu Festival (liogc nguedx liogc) and Chinese Spring Festival.

Figure 8 Traditional granaries in Dengcen village

Figure 9 Drum tower in Dengcen village

Figure 10 An aerial view of Dengcen village (1) Houlong Mountain; (2) Yew Spring; (3) Root Gate; (4) Granaries; (5) Drum Tower; (6) primary school; (7) stage; (8) clinic (9) Lounge Bridge; (10) Dimen River; (11) country road
(Citing source: Google Earth)

Lying at the eastern end of the Yungui Plateau, Dengcen is located deep in the mountains. The remote location has been keeping Dengcen isolated for centuries from the rest of the world. At present, four meters wide road running through the village is the only connection with neighboring communities (Figure 10). Moreover, there is only one bus commutes every day between the village and Liping County which is the nearest transport hub to Dengcen village. Owing to the poor traffic facilities, Dengcen had successfully resisted outside influences for many years. However, visible changes are happening gradually since the outside world has come to Dengcen village, along with far-reaching impacts on people's lifestyle and conception. For instance, most of the young adults have left their home village for job opportunities in distant urban areas since a recent couple of decade, instead of engaging in agriculture as their elder generations did. Reported by the latest Report of Human Resources and Social Security Statistics of

Guizhou Province ("贵州省2016年人力资源和社会保障事业统计公报," 2016), the number of migrant workers from rural areas in Guizhou province has increased by a record 1.25% from 2015 to 2016, which have been continuing the upward trends over last 10 years. As a result, labor force for agroforestry has become less and less in this village. Rapid social changes and outside development intervention have been threatening the traditional culture, institution, and lifestyle of this time-honored and peaceful village.

Chapter 3. Data collection and analysis

3.1. Data collection

Data were collected by field survey in Dengcen village in Guizhou province, Southwest China. Pre-research and the first survey were conducted from 16th July to 26th July in 2016 while supplementary survey was conducted from 9th Jan to 21st Jan, 2017.

Figure 11 Staying with local people in Dengcen village

Before the field survey, prior consent from the leader of target community had been confirmed through a researcher from Guizhou University of Finance and Economics, who had done field surveys in that community. When arriving at the village, a short meeting with the leader and village representatives was held to explain the objectives and methodology of the survey. Informed consents from each respondent were confirmed before interview and test.

Key informant interviews were conducted with key individuals in Dengcen village during pre-research, such as elders or villagers who expert in their traditions, cultures, and practical skills, to collect information about FTK in Dengcen village. Information of key informants in this study is shown in Table 3.

Table 3 information of key informants in Dengcen case study

Key informant	Gender	Age	Occupation / Specialty
Villager A	Male	83	Physician, geomancer
Villager B	Male	78	Expert of weaving rattan basket
Villager C	Male	69	Expert of traditional architecture
Villager D	Female	79	Expert of weaving and dyeing cloths
Villager E	Female	68	Expert of making bark papers
Villager F	Male	50	Village leader

Semi-structured interviews were conducted with key informants. Interview outlines were drafted before interviews according to the identities of each key informant. With the help from the experts in traditional knowledge and practices, outline and categories of FTK in Dengcen village are defined. During key informant interviews, respondents sometimes reported orally, sometimes they introduce knowledge and skills by materials and practices (Figure 12).

Figure 12 Key informant interviews during pre-research

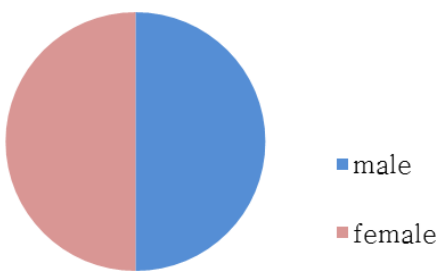
3.1.1. Sampling method and sample description

In this study, not all of the samples were sampled randomly. To keep the population of each age/gender group equal, the entire sample size was decided by the smallest population of single age group. Due to the young people in Dengcen village are mostly working or studying in urban areas, it was difficult to meet and interview those who belong to the youngest generation, whose ages are from 15 to 36. Thus, the maximum of the available population of the youngest generation had determined the sample size of the other two age groups. Each age group includes 20 samples, consists of 10 male respondents and 10 female respondents. In summary, samples of the oldest generation and middle generation were sampled randomly while samples of the youngest generation were consciously selected.

60 respondents, from 45 households in Dengcen village, have been involved in FTKAT to observe the states and trends of FTK within each age/gender group. Besides, one's experience of living in

urban areas and education level, which were considered as factors influencing FTK retention, were also inquired during the survey. Within these 60 respondents, half of them have the experience of urban life for jobs or study. For education level, most respondents had junior school or higher education. Either population of respondents had primary school education or population of respondents uneducated is less than the highest education group (Figure 13).

(A)



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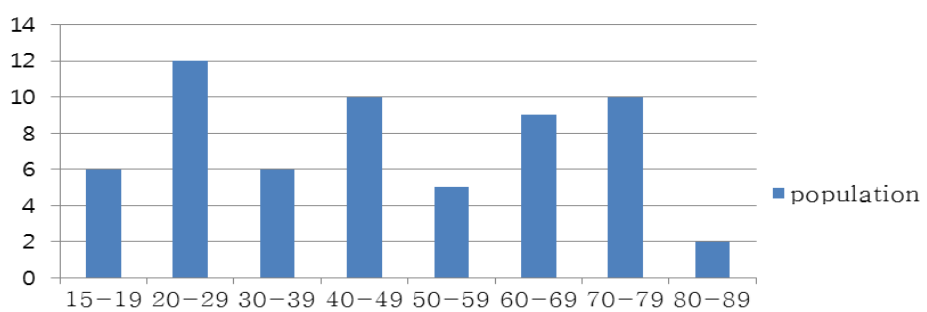

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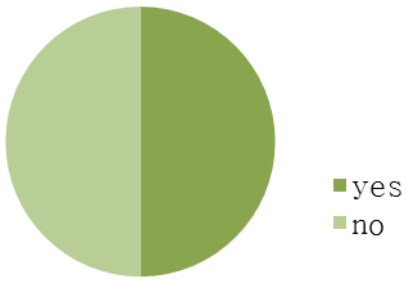

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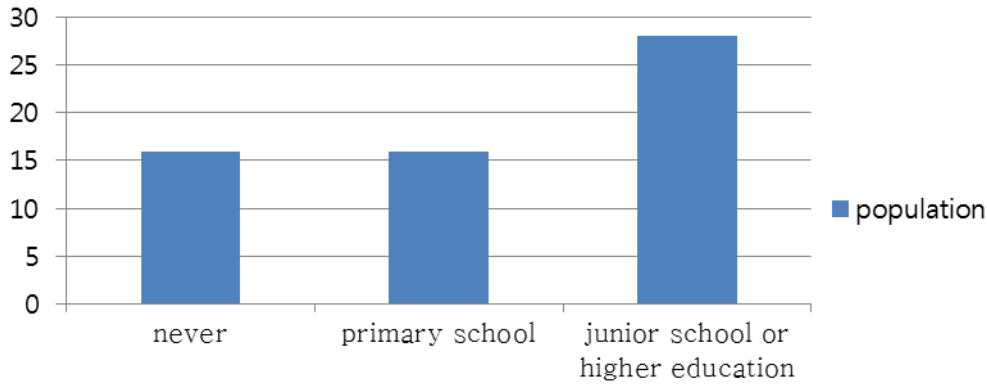


(E)

Figure 13 Frequencies of respondents (A) population of each generation (B) population of each gender (C) distribution of respondents' ages (D) distribution of respondents' experience of living in urban area (E) distribution of respondents' education level

3.1.2. Local FTK system in Dengcen village

Local FTK system was sorted out by integrating interview records and textual materials (Table 4). Subsequently, a FTK aptitude test (FTKAT) was made up according to the clarified FTK local domains.

FTK local domains in Dengcen village include CK component with three primary domains: traditional forest culture, traditional forest governance, and ecological knowledge; and PS component with two primary domains: traditional forest resources utilization and access to wildlife resources.

Traditional forest culture

The first primary domain of CK component is traditional forest culture consists of religious belief domain (RB), and customs and ritual domain (CR). RB domain can be subdivided into taboos, totems, and traditional protected area while CR domain is subdivided into folklores, traditional festival, and sacrifice. To be specific, FTK in the form of taboos urges local people to refrain from cutting sacred trees or farming in the sacred mountain. Totems and traditional protected area are about local people's self-cognition of some representative objects or specific locations in the local community. Categories under CR domain are slightly different. Although FTK in the form of folklores, traditional festival, and sacrifice is somehow relevant to religion, however, they are specific social behaviors and ceremonies performed on a regular basis by individuals or specialized people within the community.

(A) (B)

Figure 14 Examples of traditional forest culture in Dengcen village (A) timber bridge represents people's spirit (B) people wearing linen (ganl) on their heads as a tradition during funeral

Traditional forest governance

The second primary domain of CK component is traditional forest governance. In each community of Dong ethnic group, one or more elders are honored as sage of a community, which called "nyenc laox" in Dong language. Before reforms of local

administration system forest governance system in China, the sage plays a significant role in social affairs. Local organization under the leadership of sage is the decision maker in each community. For the purpose of regulating community members' behavior, the local organization sets rules and also gives a penalty. These rules and penalty, have been maintaining their power for centuries, had become customary laws and village regulations. Although the sage now has less authority than before, however, customary laws and regulations in forest governance are still being used by village leaders nowadays. Within the customary laws and regulations in forest governance, community members' forests rights and boundary delimitation are defined.

Figure 15 Customary forestry regulations in Dengcen village

Ecological knowledge

The last primary domain of CK component is about ecological knowledge retained by local people. Being closely tied to forests, people in this area possess a wealth of ecological knowledge which can be mainly classified as knowledge of plants, animals, relations of ecological process and functions, and watershed management. To be specific, it is about the identification of common creatures in forests nearby, disaster forecast associated with the ecological environment, and irrigation using natural water resource.

Figure 16 Examples used as visual supplement to questions of ecological knowledge domain

Traditional forest resources utilization

Utilization of forest resources occupies a large proportion of PS component in FTK local domains with four secondary domains: agroforestry techniques and skills (AS), craft skills (CS), traditional food preparation or processing (TF), and traditional architecture (TA). Agroforestry techniques and skills involve techniques and skills of cultivation, timber production, and collection of non-timber product that local people practice in their daily life. Contents of craft skills, traditional food, and traditional architecture have differences according to one's gender. In other words, some of the FTK categories are learnt only by male or female in local community. For instance, skills of making bark papers and weaving cotton cloth are fields only for women. Similar cases can be found in other forms of FTK. In Dengcen village, traditional architecture is men's territory while women are always responsible for traditional foods preparation or processing.

(A)

(B)

(C)

Figure 17 Examples of traditional forest resources utilization in Dengcen village (A) making bark papers (B) weaving rattan basket (C) construction site of traditional architecture

Access to wildlife resources

This primary domain has a single secondary domain as hunting and fishing skills (HF). Contents of hunting and fishing skills also have differences between male and female as that of utilization skills. Hunting is responsibility and also entertainment for men rather than women since ancient times. On the contrary, fishing skill is daily practiced by both men and women in Dengcen.

Table 4 Local FTK system in Dengcen village

Component	Primary domain	Secondary domain	Tertiary domain
Conceptual Knowledge (CK)	Traditional forest culture	Religious belief (RB)	Taboos Totems Traditional protected area Folklores
		Customs and rituals (CR)	Traditional festival Sacrifice
	Traditional forest governance	Customary laws and village regulations (CV)	Local organization Regulation and penalty
		Forests rights (FR)	Access rights and use rights Boundary delimitation
	Ecological knowledge	Plants (PI)	Identification

		Animals (AI)	Identification
		Relations of ecological process and functions (DF)	Disaster forecast
		Watershed management (WM)	Irrigation
Practical Skills (PS)	Traditional forest resources utilization	Agroforestry techniques and skills (AS)	Cultivation Timber production Collection of non-timber product
		Craft skills (CS)	Making bark papers Weaving rattan baskets Dyeing cloths Weaving cotton cloth Hand embroidery
		Traditional food preparation or processing (TF)	Coloring sticky rice Making wine

		Making Zongzi Making Baba Making sweet porridge Making cured meat and fish
	Traditional architecture (TA)	Building house Building granaries Building drum tower Building pavilion Building bridge
Access to wildlife resources	Hunting and fishing skills (HF)	Hunting Fishing

3.1.3. FTKAT in Dengcen village

Having been conducted to 60 random samples, FTKAT measured the states and trends of FTK retained by local people through its results.

Each respondent was randomly assigned any number from 1 to 60 during the test. Their total scores consist of scores of CK component and scores of PS component. When showing FTKAT scores of all 60 respondents (Table 5), each respondent is incorporated into the age/gender group that he/she belongs to. Before calculating VITEK statistics, every score is converted into a percentage by standardization.

Table 5 FTKAT scores of 60 respondents

Gender	Age group	Component	1	2	3	4	5	6	7	8	9	10	Average
Male	MG_0	CK	37	37	39	39	39	39	37	40	40	38	38.5
		PS	53	33	51	30	29	40	32	41	38	53	40
		TOT	90	70	90	69	68	79	69	81	78	91	78.5
	MG_1	CK	36	34	36	35	36	36	34	38	37	37	35.9
		PS	28	30	47	39	40	37	31	31	37	46	36.6
		TOT	64	64	83	74	76	73	65	69	74	83	72.5
	MG2	CK	34	37	33	25	23	34	37	35	32	35	32.5
		PS	19	34	36	11	18	23	28	31	22	26	24.8
		TOT	53	71	69	36	41	57	65	66	54	61	57.3
Female	FG_0	CK	39	39	38	39	40	40	38	38	38	39	38.8
		PS	57	59	60	60	59	58	56	58	56	57	58
		TOT	96	98	98	99	99	98	94	96	94	96	96.8
	FG1	CK	37	35	30	35	37	40	38	36	35	38	36.1
		PS	56	51	48	49	60	52	53	52	40	46	50.7
		TOT	93	86	78	84	97	92	91	88	75	84	86.8

FG2	CK	33	32	17	30	33	34	23	33	36	33	30.4
	PS	37	29	13	46	30	39	17	37	45	32	32.5
	TOT	70	61	30	76	63	73	40	70	81	65	62.9

MG_0: the oldest male generation

MG_1: the middle male generation

MG_2: the youngest male generation

FG_0: the oldest female generation

FG_1: the middle female generation

FG_2: the youngest female generation

CK: conceptual knowledge component

PS: practical skills component

TOT: total scores of the test (two components)

3.2. Data analysis

In this study, data analysis includes two parts.

3.2.1. VITEK statistics

Status and trends of FTK are measured by VITEK statistics provided by Zent and Maffi (2012) of which consists three measures: the intergenerational rate of retention, the cumulative rate of retention, and the annual rate of change (Figure 18).

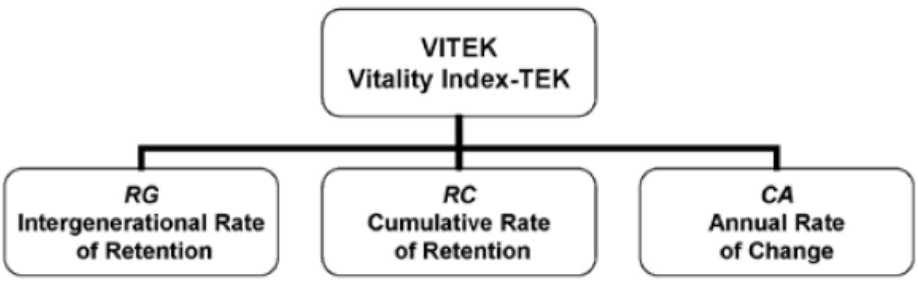


Figure 18 VITEK statistics

According to Zent and Maffi (2012), the intergenerational rate of retention (RG) shows the rate of retention between any successive pair of age groups and is calculated as the ratio of the age group mean to that of the age group immediately preceding it. The formula is given by:

$$RG_t = \frac{\overline{g}_t}{\overline{g}_r}$$

$\overline{g}_t$: the mean score of the target age group
$\overline{g}_r$: the mean score of the reference age group

It is notable that the RGt of the oldest generation is set at 1 due to no information about the FTK aptitude level of the previous generation is available. Therefore, any changes have occurred in prior generations cannot be assumed.

The cumulative rate of retention (RC) reflects the proportion of

the baseline FTK aptitude level retained by each succeeding age group. As with the RG calculation, the RC of the oldest age group is set at 1. The formula is defined as:

$$RC_t = RC_r 10^{\log RG_t}$$

RC_r: the cumulative rate of retention of reference age group
RG_t: the intergenerational rate of target age group

The annual rate of change (CA) represents the average rate and direction of the aptitude level change per year reflected by the target age group and the formula is given by:

$$CA_t = \frac{RC_t - 1}{yg_t}$$

yg_t: the length in years of the target age group's interval

As a new and unique tool serves to measure the retention or change of TEK, VITEK methodology is not well-known and rarely used in academic research so far. Although its feasibility, practicality and efficiency have been evaluated through pilot study, however, the reliability of VITEK method has yet to be further discussed. For the sake of ensuring the results that worked out by VITEK statistics in this study are reliable, an additional verification was conducted. 60 respondents were evenly divided into two sets of data, keeping populations of each age/gender group equal. Subsequently, VITEK statistics was calculated again using these two sets of data for gender or age groups. The supplemental results are almost identical with the original results that reflected in the current status and changes of FTK, which verified the reliability of the method.

3.2.2. Analysis of factors influencing FTK retention

Furthermore, statistical analysis is conducted by SPSS 23 to compare differences between FTK retained by respondents with different demographic and socio-economic characteristics and find

out the influencing factors of FTK retention. In general Independent-samples T-Test and One-way ANOVA are methods commonly used to examine if there is any significant difference between two or more independent groups. However, it is necessary to check whether the distribution of data is normal or not before method selection. In this study, one of the methods of normal distribution testing – One-Sample Kolmogorov-Smirnov Test – was conducted. According to the results of One-Sample Kolmogorov-Smirnov Test, it is found that data of total scores of the test (TOT) and PS component scores are normal distributed ($p>.05$) while data of CK component scores are non-normal distributed ($p<.05$) (Table 6). To further check the distribution, Table 7 and Table 8 show the results of each secondary domain belonging to CK or PS component. The null hypothesis that the distribution is normal had been rejected among all the secondary domains ($p<.05$).

Table 6 Results of One-Sample Kolmogorov-Smirnov Test of three components

One-Sample Kolmogorov-Smirnov Test

		TOT	CK	PS
N		60	60	60
Normal Parameters[a,b]	Mean	.7567	.8742	.6734
	Std. Deviation	.16571	.13027	.22191
Most Extreme Differences	Absolute	.090	.203	.104
	Positive	.080	.167	.071
	Negative	-.090	-.203	-.104
Test Statistic		.090	.203	.104
Asymp. Sig. (2-tailed)		.200[c,d]	.000[c]	.174[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Table 7 Results of One-Sample Kolmogorov-Smirnov Test of secondary domains of conceptual knowledge Component

One-Sample Kolmogorov-Smirnov Test

		RB	CR	CV	FR	PI	AI	DF	WM
N		60	60	60	60	60	60	60	60
Normal Parameters[a,b]	Mean	.8451	.9630	.9222	.8695	.9390	.7390	.9000	.9750
	Std. Deviation	.12712	.09951	.18785	.21933	.12994	.25376	.30253	.10989
Most Extreme Differences	Absolute	.184	.462	.494	.457	.497	.248	.530	.540
	Positive	.112	.355	.339	.276	.319	.212	.370	.410
	Negative	-.184	-.462	-.494	-.457	-.497	-.248	-.530	-.540
Test Statistic		.184	.462	.494	.457	.497	.248	.530	.540
Asymp. Sig. (2-tailed)		.000[c]	.000[c]	.000[c]	.000[c]	.000[c]	.000[c]	.000[c]	.000[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Table 8 Results of One-Sample Kolmogorov-Smirnov Test of secondary domains of practical skills component

One-Sample Kolmogorov-Smirnov Test

		AS	CS	TF	TA	HF
N		60	60	60	30	60
Normal Parameters[a,b]	Mean	.8675	.5326	.7885	.2750	.5945
	Std. Deviation	.16371	.30982	.20603	.33573	.31494
Most Extreme Differences	Absolute	.217	.178	.160	.206	.218
	Positive	.209	.178	.152	.199	.218
	Negative	-.217	-.125	-.160	-.206	-.199
Test Statistic		.217	.178	.160	.206	.218
Asymp. Sig. (2-tailed)		.000[c]	.000[c]	.001[c]	.002[c]	.000[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Considering the results of normal distribution test, the non-parametric alternative test to the independent-sample t-test – Mann-Whitney U Test – is used to determine if differences in FTK retention existed between male and female respondents, as well as between respondents have and have no experience of living in urban area. In spite of the distribution is indicated non-normal, one-way ANOVA is conducted to check the differences of FTK retention between each education level, as well as each generation

which cannot be completed by non-parametric tests such as Kruskal-Wallis H Test.

In addition, to check which independent variable has more explanation ability to FTK retention, Stepwise Regression is conducted in this study.

When conducting the analysis, statistically significant levels are reported for p values less than or equal to 0.05.

Chapter 4. Results

4.1. Results of VITEK statistics

Using the data analysis methods introduced above, status and trends of FTK in Dengcen village are demonstrated in the results of VITEK statistics (Table 9, Table 10, and Table 11).

Table 9 shows the results of vitality index calculating with total scores which consist of both CK and PS components. The intergenerational rate of retention (RG), the cumulative rate of retention (RC), and the annual rate of change (CA) demonstrated a decline of FTK retained by respondents. The average rate and direction of change per year reflected by all generation groups combined (CA_a) indicate a downturn within all gender groups, including the combination of men and women.

Table 9 Vitality index calculation of total scores of the test by age/gender group

Generation/ gender group	Mean score	RG	RC	CA	CA_a
Male					−0.005
MG_0	78.5	1.000	0.000	0.000	
MG_1	72.5	0.924	0.924	−0.003	
MG_2	57.3	0.790	0.730	−0.012	
Female					−0.006
FG_0	96.8	1.00	0.000	0.000	
FG_1	86.8	0.897	0.897	−0.003	
FG_2	62.9	0.725	0.650	−0.016	
Combined					−0.006
CG_0	87.65	1.00	0.000	0.000	
CG_1	79.65	0.909	0.909	−0.003	
CG_2	60.1	0.755	0.686	−0.014	

CG_0: the oldest generation with both male and female

CG_1: the middle generation with both male and female
CG_2: the youngest generation with both male and female
CA_a: the average rate and direction of change per year reflected by all generation groups combined

Narrowing down to CK component, shown in Table 10, the declines of FTK are seen. Nonetheless, CA_a in this table shows that although the direction of change per year remains reduced, however, the decrease rate within each gender groups are slightly less significant than that of TOT.

Table 10 Vitality index calculation of conceptual knowledge component by age/gender group

Generation/ gender group	Mean score	RG	RC	CA	CA_a
Male					−0.003
MG_0	38.5	1.000	1.000	0.000	
MG_1	35.9	0.932	0.932	−0.002	
MG_2	32.5	0.905	0.844	−0.007	
Female					−0.004
FG_0	38.8	1.000	1.000	0.000	
FG_1	36.1	0.930	0.930	−0.002	
FG_2	30.4	0.842	0.784	−0.010	
Combined					−0.003
CG_0	38.65	1.000	1.000	0.000	
CG_1	36	0.931	0.931	−0.002	
CG_2	31.45	0.874	0.814	−0.008	

When looking at the PS component (Table 11), however, the retention status of FTK within each age/gender group is even more critical than that of the TOT (Table 9). Vitality indexes in this table show a sharper decline which means that FTK in the form of practical skills have been facing significant erosion

Table 11 Vitality index calculation of practical skills component by age/gender group

Generation/ gender group	Mean score	RG	RC	CA	CA_a
Male					−0.007
MG_0	40	1.000	1.000	0.000	
MG_1	36.6	0.915	0.915	−0.003	
MG_2	24.8	0.678	0.620	−0.017	
Female					−0.008
FG_0	58	1.000	1.000	0.000	
FG_1	50.7	0.874	0.874	−0.004	
FG_2	32.5	0.641	0.560	−0.020	
Combined					−0.007
CG_0	49	1.000	1.000	0.000	
CG_1	43.65	0.906	0.906	−0.003	
CG_2	28.65	0.645	0.585	−0.019	

4.1.1. Intergenerational rate of retention (RG)

Sharp declines of RG represent the FTK retention within respondents has been decreased from the oldest generation to the youngest one according to the results of the TOT (Figure 19). It shows that the retention rates of respondents in middle age are approximately 90% of that retained by the oldest generation. Moreover, the youngest generation is maintaining 72% (female) to 79% (male) of the FTK retained by middle generation, which means there is a more severe erosion of FTK within the respondents who were born in the 1980s to 2000s. There are differences between each gender group while female respondents retained the sharpest decline with both the middle and the youngest generations.

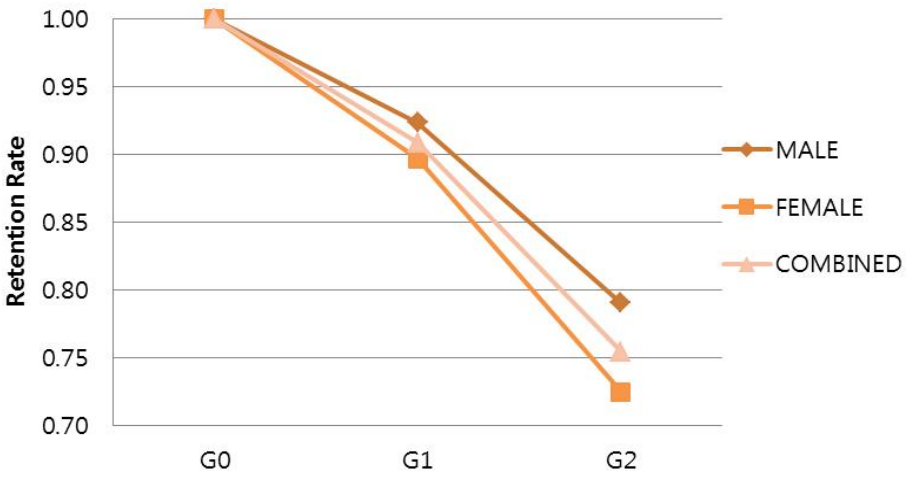


Figure 19 Intergenerational rate of retention of total scores of the test

Declines from the oldest to the youngest generation are seemed milder when narrowing down to the CK component (Figure 20). No difference is shown between gender groups in middle generation. Thus, it can be inferred that FTK in the form of conceptual knowledge has relatively maintained the stability within the middle generation. Nonetheless, low retention rates occurred within the youngest respondents; in particular, the retention rates of female respondents are still notable.

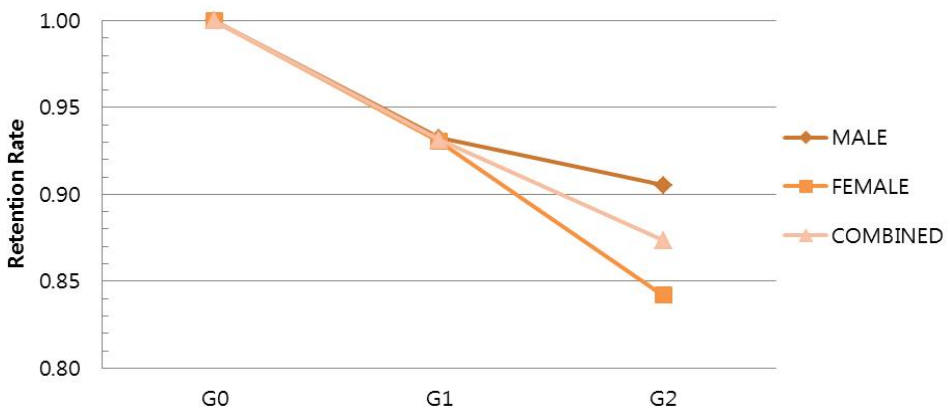


Figure 20 Intergenerational rate of retention of conceptual knowledge component

Results of RG of PS component (Figure 21) have a similar pattern with that of the TOT but with a sharper rate of decline. FTK

retained by the youngest generation is around 64% (female) to 68% (male) of that retained by middle generation, which means that FTK in the form of practical skills has been eroded severely between the middle and the youngest generation. In this case, female respondents retained lower retention rates than male respondents for both middle generation and the youngest generation, which confirms to that of TOT.

Figure 21 Intergenerational rate of retention of practical skills component

4.1.2. Cumulative rate of retention (RC)

The cumulative rate of retention (RC) shows the cumulative decline of FTK. Comparing to the respondents from oldest generation, respondents from middle generation are retaining about 90% of the FTK that their elder generation has been retaining (Figure 22). The youngest respondents, of who most are grandchildren of the oldest generation, are now retaining FTK only 65% (female) to 73% (male) of their grandparents. Moreover, almost 10% differences between gender groups occur within the youngest generation.

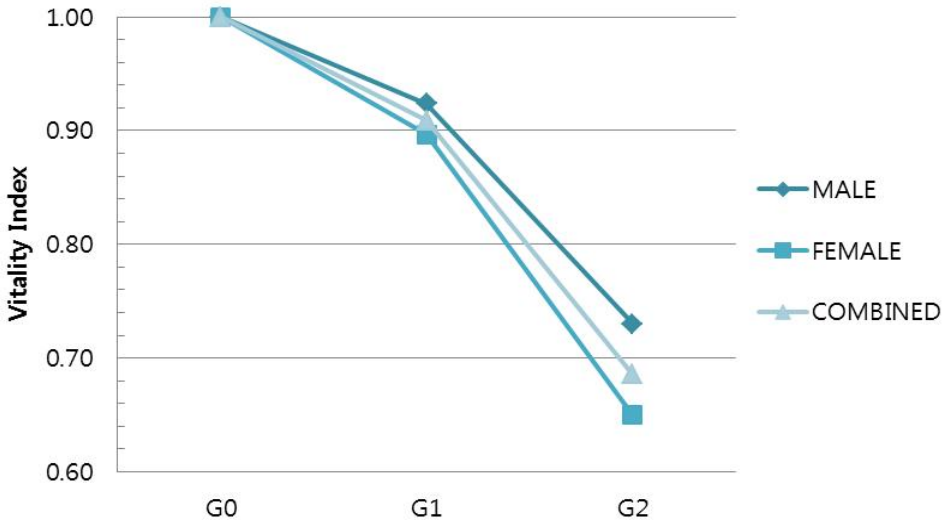


Figure 22 Cumulative rate of retention of total scores of the test

Similar with the results of RG, declines of CK component (Figure 23) are less critical than the results of the TOT. Middle age respondents from either male or female group are retaining more than 90% of FTK when comparing with their parents. Differences between gender groups increased within the youngest generation while female respondents maintaining less than 80%, male respondents retaining no more than 85% of FTK that has possessed by the oldest respondents.

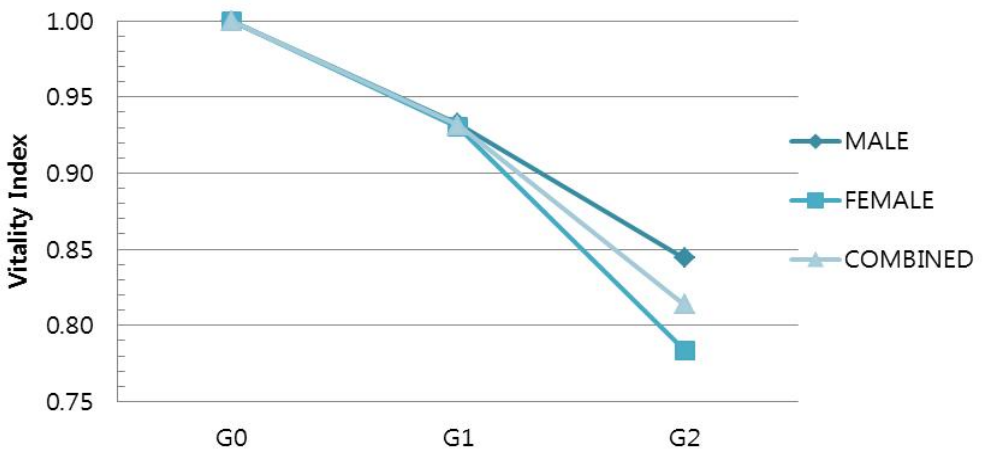


Figure 23 Cumulative rate of retention of conceptual knowledge component

Similar but more critical situations were found in the PS component (Figure 24). The youngest respondents are found as retaining 56% (female) to 62% (male) of FTK possessed by the oldest generation.

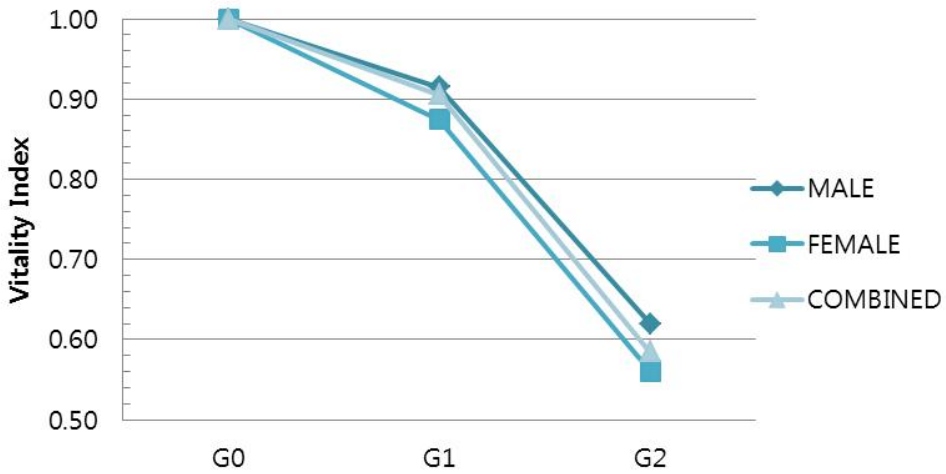


Figure 24 Cumulative rate of retention of practical skills component

4.1.3. Annual rate of change (CA)

The annual rate of change (CA) represents the average rate and direction of change per year reflected by the target generation. Integrating FTK in the forms of conceptual knowledge and practical skills (Figure 25), FTK had decreased about 0.3% per year while this rate rises to 1.4% (female) to 1.6% (male). With this rate of change, it can be inferred that FTK in Dengcen village will have died out within next 100 years if this trend continues.

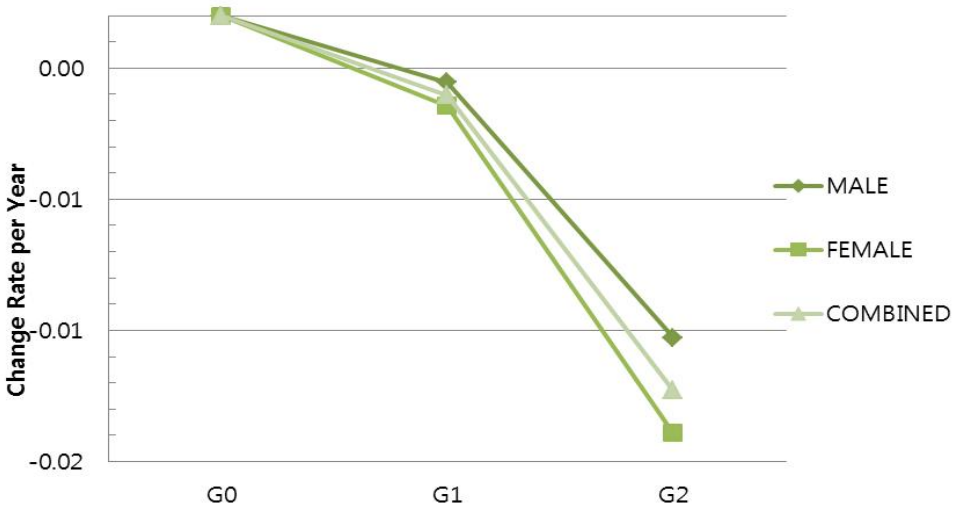


Figure 25 Annual change rates of total scores of the test

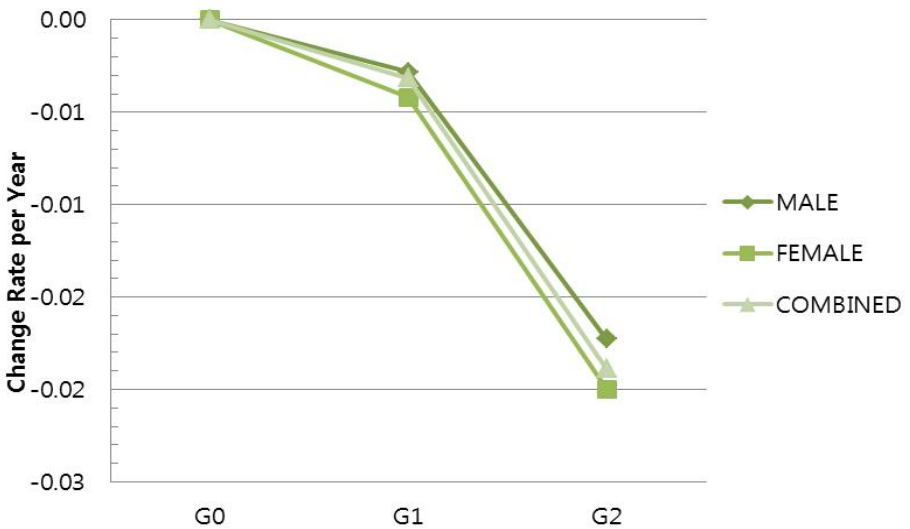


Figure 26 Annual change rates of FTK in the form of practical skills

This process may take even less time in terms of FTK in the form of practical skills (Figure 26). From the oldest generation to middle generation, FTK was decreasing at the speed of about 0.4% per year. However, the reduction accelerates to 2% per year (female) at most within the youngest respondents, which means that traditional practical skills relevant to forests will have been disappeared in the last half of this century if this trend continues. According to the results of the CA of CK component (Figure 27), declines within the middle generation are at similar level with that

of the TOT and the decrease from the middle to the youngest generation are less critical than that of PS component.

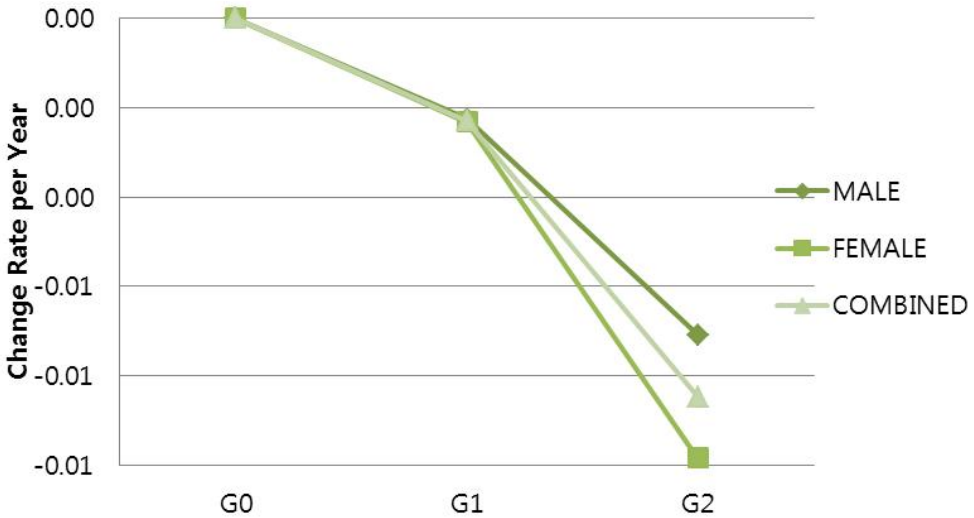


Figure 27 Annual change rate of FTK in the form of conceptual knowledge

Table 12 shows the annual change rate of each FTK domains. In this table, boxes that marked in different color represent a noticeable decrease or increase of FTK reflected by each gender/age groups. Yellow boxes indicate sharp declines from previous generation greater than or equal to a loss of 1% per year. Red boxes indicate terrific declines from previous generation greater than or equal to a loss of 1.5% per year. In contrast, green boxes indicate an improvement from the previous generation.

There are only two “improvement” which can be found in TF domain and HF domain of male respondents in middle age. Besides, a very sharp decline in CS domain is found in this gender/age group. Within the next diminishing male group, significant or very sharp decline appear in several domains such as Forests Rights domain (FR), AI domain of the CK component, AS, CS, HF domain of the PS component, and they are also found in the PS component and the TOT. Moreover, an extremely sharp decline equivalent to a loss of 4% is found in the TA domain within the youngest male respondents.

In terms of female respondents, noticeable changes are only found in the youngest generation. Both components demonstrated notable declines; in particular, FTK in the form of practical skills

has been decreased 2% per year. CV and DF domain of CK component, AS domain of PS component, are shown to be sharply eroded. FR, AI, CS, TF, HF are decreasing at a striking speed. These sharp declines within young female respondents are also found in the results of intergenerational rate and cumulative rate.

Similar results are seen in age groups of combining male and female respondents. Significant and very sharp declines occurred only within the youngest generation.

Table 12 Annualized Rate of each component and secondary domain of FTK in Deng-cen village

CA_t	Conceptual Knowledge Component (CK)								Practical Skills Component (PS)					Components		
	RB	CR	CV	FR	PI	AI	DF	WM	AS	CS	TF	TA	HF	CK	PS	TOT
MG_0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MG_1	−0.003	−0.001	0.000	0.000	−0.004	−0.006	0.000	0.000	−0.002	−0.015	0.002	−0.006	0.005	−0.002	−0.003	−0.003
MG_2	−0.008	−0.004	−0.006	−0.016	−0.006	−0.013	−0.009	−0.002	−0.014	−0.016	−0.004	−0.040	−0.010	−0.007	−0.019	−0.013
$MG_{1\&2}$	−0.002	−0.001	−0.001	−0.003	−0.003	−0.005	−0.002	0.000	−0.004	−0.008	0.000	−0.010	−0.001	−0.002	−0.005	−0.004
FG_0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	−	0.000	0.000	0.000	0.000
FG_1	−0.004	−0.001	−0.001	−0.001	0.000	−0.005	0.000	0.000	−0.002	−0.007	−0.003	−	−0.005	−0.002	−0.004	−0.003
FG_2	−0.009	−0.005	−0.014	−0.015	−0.005	−0.024	−0.018	−0.005	−0.013	−0.025	−0.021	−	−0.019	−0.010	−0.020	−0.016
$FG_{1\&2}$	−0.003	−0.001	−0.003	−0.003	−0.001	−0.007	−0.004	−0.001	−0.003	−0.007	−0.005	−	−0.005	−0.003	−0.006	−0.004
CG_0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	−	0.000	0.000	0.000	0.000
CG_1	−0.003	−0.001	−0.001	0.000	−0.002	−0.005	0.000	0.000	−0.002	−0.009	−0.001	−	0.000	−0.002	−0.004	−0.003
CG_2	−0.009	−0.004	−0.010	−0.015	−0.005	−0.019	−0.014	−0.003	−0.013	−0.022	−0.013	−	−0.015	−0.008	−0.020	−0.015
$CG_{1\&2}$	−0.003	−0.001	−0.002	−0.003	−0.002	−0.006	−0.003	−0.001	−0.003	−0.007	−0.003	−	−0.003	−0.002	−0.005	−0.004

MG_0: the oldest male generation

MG_1: the middle male generation

MG_2: the youngest male generation

$MG_{1\&2}$: male generations 1 and 2 taken together

FG_0: the oldest female generation

FG_1: the middle female generation

FG_2: the youngest female generation

$FG_{1\&2}$: female generations 1 and 2 taken together

CG_0: the oldest generation with both male and female
CG_1: the middle generation with both male and female
CG_2: the youngest generation with both male and female
$CG_{1\&2}$: both male and female generations 1 and 2 taken together

RB: Religious belief
CR: Customs and rituals
CV: Customary laws and village regulations
FR: Forest rights
PI: Plant identification
AI: Animal identification
DF: Disaster forecast
WM: Watershed management
AS: Agroforestry skills
CS: Craft skills
TF: Traditional food preparation or processing
TA: Traditional architecture
HF: Hunting and fishing skills
CK: Conceptual knowledge component
PS: Practical skills component
TOT: total scores of the test
Yellow color: indicates a significant decline from previous generation equivalent to a loss of [3]0.01 (1%) per year
Red color: indicates a very sharp decline from previous generation equivalent to a loss of [3]0.015 (1.5%) per year
Green color: indicates an improvement from previous generation

4.2. Factors influencing the retention of FTK

Descriptive statistics together with the Mann-Whitney U Test are presented in Tables 13-14. Results of ANOVA are shown in Tables 15-20. Names of each component and domain in the tables have been abbreviated.

4.2.1. Gender influencing the retention of FTK

Table 13 represents the results of difference between male and female respondents' FTKAT scores. For this case, scores of TA domain has been eliminated because teaching and learning of traditional architectural techniques are available only to male members of the target community. For this reason, TA domain was absent in the FTKAT questions for female respondents (Appendix I) thus there were no scores of TA domain collected from female respondents.

The results shown in Table 13 indicate significant differences between male and female respondents in the scores of TOT, PS component, and CS domain belonging to the PS component.

Table 13 Difference between male and female respondents' FTKAT scores

Dependent variables	Gender	N	Mean	S.D.	median	Z score	P value
TOT	Male	30	.6925	.12958	.6884	−3.549	.000*
	Female	30	.8210	.17476	.8694		
	Total	60					
CK	Male	30	.8908	.09434	.9125	−.357	.721
	Female	30	.8575	.15827	.9000		
	Total	60					
PS	Male	30	.5625	.16965	.5415	−4.030	.000*
	Female	30	.7843	.21441	.8583		
	Total	60					
RB	Male	30	.8491	.12604	.8820	−.143	.886
	Female	30	.8412	.13022	.8820		
	Total	60					
CR	Male	30	.9667	.07795	1.0000	−.274	.784
	Female	30	.9593	.11850	1.0000		
	Total	60					

CV	Male	30	.9556	.11513	1.0000	−.867	.386
	Female	30	.8889	.23714	1.0000		
	Total	60					
FR	Male	30	.8833	.21509	1.0000	−.510	.610
	Female	30	.8556	.22629	1.0000		
	Total	60					
PI	Male	30	.9112	.14978	1.0000	−1.654	.098
	Female	30	.9667	.10161	1.0000		
	Total	60					
AI	Male	30	.7557	.19439	.6670	−.080	.936
	Female	30	.7222	.30438	.6670		
	Total	60					
DF	Male	30	.9333	.25371	1.0000	−.853	.393
	Female	30	.8667	.34575	1.0000		
	Total	60					
WM	Male	30	.9833	.09129	1.0000	−.587	.557
	Female	30	.9667	.12685	1.0000		
	Total	60					
AS	Male	30	.8739	.16111	.9440	−.559	.576
	Female	30	.8610	.16876	.8890		
	Total	60					
CS	Male	30	.3208	.16309	.2500	−5.178	.000*
	Female	30	.7445	.27542	.8330		
	Total	60					
TF	Male	30	.7875	.17723	.7500	−.754	.451
	Female	30	.7895	.23441	.8865		
	Total	60					
HF	Male	30	.6322	.28985	.6670	−.675	.500
	Female	30	.5667	.34072	.5000		
	Total	60					

*P value of <.05 is statistically significant

4.2.2. Experience of living in urban areas influencing FTK retention

Table 14 represents the results of difference between FTKAT scores of respondents who have and have no experience of living in urban area. The significant differences between respondents have or have no experience of living in urban area are reflected in the scores of two components and the majority of the secondary domains except for DF domain and WM domain belonging to the CK component, and HF domain belonging to PS component.

Table 14 Difference between FTKAT scores of respondents have/have no experience of living in urban area

Dependent variables	Experience	N	Mean	S.D.	median	Z score	P value
TOT	yes	30	.6672	.13666	.6834	−4.377	.000*
	no	30	.8462	.14359	.9045		
	Total	60					
CK	yes	30	.8325	.14469	.8500	−4.556	.000*
	no	30	.9158	.13334	.9500		
	Total	60					
PS	yes	30	.5592	.17857	.5499	−4.008	.000*
	no	30	.7876	.23039	.8748		
	Total	60					
RB	yes	30	.7903	.13344	.8240	−3.811	.000*
	no	30	.8999	.09409	.9410		
	Total	60					
CR	yes	30	.9408	1.0000	.12289	−2.271	.023*
	no	30	.9852	.06342	1.0000		
	Total	60					
CV	yes	30	.8556	.24270	1.0000	−2.783	.005*
	no	30	.9889	.06080	1.0000		
	Total	60					
FR	yes	30	.7833	.25200	1.0000	−3.012	.003*
	no	30	.9556	.13792	1.0000		
	Total	60					
PI	yes	30	.9001	.15521	1.0000	−2.316	.021*
	no	30	.9778	.08448	1.0000		
	Total	60					
AI	yes	30	.6223	.24356	.6670	−3.685	.000*
	no	30	.8556	.20865	1.0000		
	Total	60					
DF	yes	30	.8667	.34575	1.0000	−.853	.393
	no	30	.9333	.25371	1.0000		
	Total	60					
WM	yes	30	.9667	.12685	1.0000	−.587	.557
	no	30	.9833	.09129	1.0000		
	Total	60					
AS	yes	30	.7998	.16924	.8330	−4.350	.000*
	no	30	.9351	.12813	1.0000		
	Total	60					
CS	yes	30	.4005	.22304	.3265	−2.911	.004*
	no	30	.6648	.33079	.7290		
	Total	60					
TF	yes	30	.7061	.19844	.7500	−3.589	.000*
	no	30	.8709	.18147	.9320		
	Total	60					

	yes	30	.5389	.33523	.5000		
HF	no	30	.6610	.28684	.6670	−1.405	.160
	Total	60					
	yes	17	.1559	.23643	.0000		
TA	no	13	.4308	.38920	.3000	−2.233	.026*
	Total	30					

*P value of <.05 is statistically significant

Scores of TA domain were collected from only male respondents (N=30)

4.2.3. Education influencing FTK retention

FTK scores between respondents who have three education levels are compared by one−way ANOVA and results of comparisons are presented as Table 15−17. In these tables, black lines connecting two or more independent groups represent that difference between these two or three groups is insignificant according to the results of ANOVA and Post Hot Tests.

Table 15 shows the results of comparisons of FTK scores of CK component, PS component and TOT between respondents with three education levels. It is shown that significant differences occurred among the groups of junior school or higher education and other two groups as the blue line connected uneducated group and primary school education group in the total scores, scores of CK component and scores of PS component.

Table 15 Comparisons of FTK scores (three components) between respondents with three education levels

Dependent variables	Education level	N	Mean	S.D.	Test of Homogeneity of Variances	F/Sig.
TOT	uneducated	16	.8993	.11071	p=.510	30.029/.000*
	primary school	16	.8291	.09134		
	junior or higher education	28	.6339	.13332		
	total	60	.7567	.16571		
CK	uneducated	16	.9312	.15666	p=.381	5.969/.004*
	primary school	16	.9172	.05966		
	junior or higher education	28	.8170	.12267		
	total	60	.8742	.13027		
PS	uneducated	16	.8540	.18384	p=.346	26.042/.000*
	primary school	16	.7716	.14350		
	junior or higher education	28	.5141	.16129		

total	60	.6734	.22191

*P value of <.05 is statistically significant

FTK scores of CK component are compared in table 16. Within these secondary domains of FTK, there is no significant difference occurred between three education levels in CR domain and WM domain. The other secondary domains have significant differences between the highest education level and other two levels according to the results of ANOVA and Post Hoc Tests.

Table 16 Comparisons of FTK scores (conceptual knowledge component) between respondents with three education levels

Dependent variables	Education level	N	Mean	S.D.	Test of Homogeneity of Variances	F/Sig.
RB	uneducated	16	.9374	.05862	p=.102	10.966/.000*
	primary school	16	.8676	.11053		
	junior or higher education	28	.7795	.12962		
	total	60	.8451	.12712		
CR	uneducated	16	1.0000	.00000	p=.000	2.786/.070
	primary school	16	.9792	.04475		
	junior or higher education	28	.9326	.13638		
	total	60	.9630	.09951		
CV	uneducated	16	1.0000	.0000	p=.000	5.073/.009*
	primary school	16	.9792	.08325		
	junior or higher education	28	.8453	.24821		
	total	60	.9222	.18785		
FR	uneducated	16	.9792	.08325	p=.000	10.235/.000*
	primary school	16	.9688	.12500		
	junior or higher education	28	.7500	.25459		
	total	60	.8695	.21933		
PI	uneducated	16	1.0000	.00000	p=.000	6.257/.003*
	primary school	16	.9792	.08325		
	junior or higher education	28	.8811	.16249		
	total	60	.9390	.12994		
AI	uneducated	16	.9376	.13424	p=.044	16.540/.000*
	primary school	16	.8126	.20966		
	junior or higher education	28	.5834	.23369		
	total	60	.7390	.25376		
DF	uneducated	16	1.0000	.00000	p=.000	4.145/.021*
	primary school	16	1.0000	.00000		
	junior or higher education	28	.7857	.41786		
	total	60	.9000	.30253		

WM	uneducated	16	1.0000	.00000	p=.000	1.824/.171
	primary school	16	1.0000	.00000		
	junior or higher education	28	.9464	.15749		
	total	60	.9750	.10989		

*P value of <.05 is statistically significant

Results shown in Table 17 represent the significant differences of scores of PS component between three education levels. Within these secondary domains, significant differences occurred between junior or higher education and other two education levels in AS, CS and TF domain. There is no significant difference between those three education levels in TA domain and HF domain.

Table 17 Comparisons of FTK scores (Practical Knowledge component) between respondents with three education levels

Dependent variables	Education level	N	Mean	S.D.	Test of Homogeneity of Variances	F/Sig.
AS	uneducated	16	.9756	.04045	p=.000	14.630/.000*
	primary school	16	.9339	.06492		
	junior or higher education	28	.7677	.18827		
	total	60	.8675	.16371		
CS	uneducated	16	.7934	.32673	p=.006	18.935/.000*
	primary school	16	.6137	.25290		
	junior or higher education	28	.3374	.17658		
	total	60	.5327	.30982		
TF	uneducated	16	.9333	.10653	p=.017	12.953/.000*
	primary school	16	.8495	.11078		
	junior or higher education	28	.6709	.22506		
	total	60	.7885	.20603		
TA	uneducated	5	.2500	.15811	p=.000	3.509/.044*
	primary school	8	.5187	.48177		
	junior or higher education	17	.1676	.23315		
	total	30	.2750	.33573		
HF	uneducated	16	.6876	.27127	p=.924	2.500/.091
	primary school	16	.6667	.31026		
	junior or higher education	28	.5000	.32388		
	total	60	.5945	.31494		

*P value of <.05 is statistically significant

Scores of TA domain were collected from only male respondents (N=30)

4.2.4. Age influencing FTK retention

FTK scores between respondents from the oldest, middle, and the youngest generation are compared by one-way ANOVA and results of comparisons are presented as Table 18-20. In these tables, the blue line connecting two or more independent groups means that difference between these two or three groups is insignificant according to the results of ANOVA and Post Hot Tests.

Table 18 shows the results of comparisons of FTK scores of three components between respondents from the oldest, middle and youngest generations. It is shown that significant differences occurred between the youngest generation and other two older generations in the total FTK scores. For the scores of CK component, significant differences occurred between the oldest generation and other two younger generations. When looking at the scores of PS component, significant differences again occurred between the youngest generation and the other two older ones.

Table 18 Comparisons of FTK scores (three components) between respondents from three generations

Dependent variables	Generation	N	Mean	S.D.	Test of Homogeneity of Variances	F/Sig.
TOT	oldest	20	.8759	.11505	p=.475	28.625/.000*
	middle	20	.7954	.10037		
	youngest	20	.5989	.13868		
	total	60	.7567	.16571		
CK	oldest	20	.9650	.02487	p=.016	13.374/.000*
	middle	20	.8713	.13285		
	youngest	20	.7863	.13265		
	total	60	.8742	.13027		
PS	oldest	20	.8165	.18876	p=.355	21.321/.000*
	middle	20	.7273	.15576		
	youngest	20	.4765	.16609		
	total	60	.6734	.22191		

*P value of <.05 is statistically significant

Then looking into the scores of secondary domains of CK component (Table 19), differences between the oldest generation and middle generation, the youngest generation and middle

generation are shown insignificant in the scores of CR and PI domain. Besides, there are three more situations appeared in the comparisons of this component. The significant difference is only shown between the oldest generation and other two younger generations in RB domain. Differently, the youngest generation is shown significantly different from other two generations in CV domain, FR domain, AI domain and DF domain. For the WM domain, there is no significant difference occurred between three generations.

Table 19 Comparisons of FTK scores (conceptual knowledge component) between respondents from three generations

Dependent variables	Generation	N	Mean	S.D.	Test of Homogeneity of Variances	F/Sig.
RB	oldest	20	.9352	.05358	p=.019	13.794/.000*
	middle	20	.8412	.10464		
	youngest	20	.7590	.14139		
	total	60	.8451	.12712		
CR	oldest	20	1.0000	.00000	p=.000	4.888/.011*
	middle	20	.9778	.04555		
	youngest	20	.9111	.15547		
	total	60	.9630	.09951		
CV	oldest	20	1.0000	.00000	p=.000	11.043/.000*
	middle	20	.9834	.07446		
	youngest	20	.7834	.27099		
	total	60	.9222	.18785		
FR	oldest	20	.9834	.07446	p=.000	29.576/.000*
	middle	20	.9750	.11180		
	youngest	20	.6500	.23508		
	total	60	.8695	.21933		
PI	oldest	20	1.0000	.00000	p=.000	4.535/.015*
	middle	20	.9334	.13666		
	youngest	20	.8834	.16296		
	total	60	.9390	.12994		
AI	oldest	20	.9168	.14794	p=.059	18.445/.000*
	middle	20	.7668	.21897		
	youngest	20	.5334	.22707		
	total	60	.7390	.25376		
DF	oldest	20	1.0000	.00000	p=.000	8.143/.001*
	middle	20	1.0000	.00000		
	youngest	20	.7000	.47016		
	total	60	.9000	.30253		

WM	oldest	20	1.0000	.00000	p=.000	3.353/.042*
	middle	20	1.0000	.00000		
	youngest	20	.9250	.18317		
	total	60	.9750	.10989		

*P value of <.05 is statistically significant

Results shown in Table 20 represent the significant differences of scores of PS component between three generations. These three generations are indicated to be significantly different from each other when comparing the scores of Agroforestry Skills domain (AS). Besides, significant differences occurred between the oldest generation and the youngest generation in both CS domain and HF domain. The youngest generation is significantly different between other two older generations in TF domain and TA domain.

Table 20 Comparisons of FTK scores (practical skills component) between respondents from three generations

Dependent variables	Education level	N	Mean	S.D.	Test of Homogeneity of Variances	F/Sig.
AS	oldest	20	.9777	.03786	p=.000	30.831/.000*
	middle	20	.9192	.05836		
	youngest	20	.7055	.18744		
	total	60	.8675	.16371		
CS	oldest	20	.7160	.31141	p=.001	8.071/.001*
	middle	20	.5188	.31464		
	youngest	20	.3633	.19054		
	total	60	.5327	.30982		
TF	oldest	20	.8842	.13533	p=.045	13.880/.000*
	middle	20	.8575	.12313		
	youngest	20	.6239	.23487		
	total	60	.7885	.20603		
TA	oldest	10	.4250	.40978	p=.004	4.076/.028*
	middle	10	.3450	.30863		
	youngest	10	.0550	.12572		
	total	30	.2750	.33573		
HF	oldest	20	.6668	.27029	p=.047	3.415/.040*
	middle	20	.6667	.35867		
	youngest	20	.4500	.27082		
	total	60	.5945	.31494		

*P value of <.05 is statistically significant

Scores of TA domain were collected from only male respondents (N=30)

4.2.5. Explanation ability of influencing factors to FTK retention

Before conducting the Stepwise Regression, Pearson Correlation Test was implemented. Correlations between FTK retention and three contributory factors, which are demonstrated to be influent to FTK retention, are represented in Table 21−23. These factors are the experience of living in urban areas (experience), and years of receiving education (EduYear), and one's age (age).

Table 21 Correlations of total score of the test scores and three influencing factors

Correlations

		TOT	experience	EduYear	age
TOT	Pearson Correlation	1	-.545**	-.657**	.716**
	Sig. (2-tailed)		.000	.000	.000
	N	60	60	60	60
experience	Pearson Correlation	-.545**	1	.695**	-.698**
	Sig. (2-tailed)	.000		.000	.000
	N	60	60	60	60
EduYear	Pearson Correlation	-.657**	.695**	1	-.838**
	Sig. (2-tailed)	.000	.000		.000
	N	60	60	60	60
age	Pearson Correlation	.716**	-.698**	-.838**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

Table 21 shows the correlations between the total scores of FTKAT (TOT) and three influencing factors. According to the results, all three independent variables are significantly related to the total scores of FTKAT. The experience of living in urban areas and one's education years are negatively related to the TOT. This means that people who have experience of living in urban areas and who have longer education years maintain less FTK. Besides, one's

age is strongly related to the total scores of FTKAT (r=.716, p<.01) which means older respondents get higher scores during the test.

Table 22 Correlations of conceptual knowledge component scores and three influencing factors

Correlations

		CK	experience	EduYear	age
CK	Pearson Correlation	1	-.323*	-.349**	.587**
	Sig. (2-tailed)		.012	.006	.000
	N	60	60	60	60
experience	Pearson Correlation	-.323*	1	.695**	-.698**
	Sig. (2-tailed)	.012		.000	.000
	N	60	60	60	60
EduYear	Pearson Correlation	-.349**	.695**	1	-.838**
	Sig. (2-tailed)	.006	.000		.000
	N	60	60	60	60
age	Pearson Correlation	.587**	-.698**	-.838**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	60	60	60	60

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Relations between scores of CK component and three influencing factors are shown in Table 22. All three independent variables are significantly related to the CK component scores but correlations between them become less strong when compared with results of TOT. Only age was found significantly related to the scores of concetual knowledge component. In other words, there is no statistical evidence indicates the correlations between CK component scores and one's urban living experience, education years.

Table 23 Correlations of practical skills component scores and three influencing factors

Correlations

		PS	experience	EduYear	age
PS	Pearson Correlation	1	-.519**	-.643**	.640**
	Sig. (2-tailed)		.000	.000	.000
	N	60	60	60	60
experience	Pearson Correlation	-.519**	1	.695**	-.698**
	Sig. (2-tailed)	.000		.000	.000
	N	60	60	60	60
EduYear	Pearson Correlation	-.643**	.695**	1	-.838**
	Sig. (2-tailed)	.000	.000		.000
	N	60	60	60	60
age	Pearson Correlation	.640**	-.698**	-.838**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

Looking at the correlations between scores of PS component and three influencing factors, Table 23 represents that both education years and age are strongly related to PS scores. There is a negative correlation between education years and PS scores ($r=-.643$, $p<.01$), and a positive correlation between age and PS scores ($r=.640$, $p<.01$). To be summarized, respondents who have longer education years had got fewer scores in the PS component during FTKAT. Older respondents had got higher scores in this component than younger respondents.

Before conducting stepwise regression, these three variables are standardized to the same scale by z-score transformation.

Considering the problem of Multiple Collinearity between each independent variable, it was improper to find out the ideal model for FTK retention using stepwise regression as this study supposed to do. Still, the explanation ability of each influencing factor can be examined by the test.

Results are summarized in Table 24. The value of R Square tells how much of the variance of dependent variables explained by movement in the independent variables can be attributed to the predictor variables. According to three dependent variables, the R Square of age is equivalent to 0.512, 0.344, 0.409, which means 51.2%, 34.4%, 40.9% of the variance of TOT, CK, and PS component explained by movement in the independent variables can attribute to respondent's age. The R Square values of experience are 0.297, 0.104, and 0.269 according to TOT, CK, and PS component. It should be noticed that only when R Square value over 0.3 can the model be appropriate to the dependent variable in general. For the education years, only R Square values of TOT and PS component are above 0.3. It can be explained that 42.1% and 40.3% of the variance of TOT and PS component explained by movement in the independent variables can attribute to respondent's education years.

B value tells that how much does the dependent variable increase or decrease when the predictor increases. B value of age for TOT is 0.119, means that in this study, when respondent's age increase each one year the total scores of FTKAT increase 0.119 points. Likewise, when respondent's age increase each one year the scores of CK component and the scores of PS component accordingly increase 0.076 points and 0.142 points. B values of experience and education years are minus which can be explained by the negative correlation between these two independent variables and FTK retention. When respondent receives education for each one more year, a decline of 0.109 points of total scores of FTKAT takes place. Similarly, declines of 0.045 and 0.143 of scores of CK and PS component will happen when respondent receives each one more year of education.

Table 24 A summary of the results of stepwise regression of TOT, CK and PS

Dependent variables	Independent variables (predictors)	R	R Square	Adjusted R Square	Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
					B	Std. Error	Beta	Tolerance	VIF
TOT	Zscores(age)	.716	.512	.504	.119	.015	.716	1.000	1.000
	Zscores (experience)	.545	.297	.285	−.090	.018	−.545	1.000	1.000
	Zscores (EduYear)	.657	.431	.421	−.109	.016	−.657	1.000	1.000
CK	Zscores(age)	.587	.344	.333	.076	.014	.587	1.000	1.000
	Zscores (experience)	.323	.104	.089	−.042	.016	−.323	1.000	1.000
	Zscores (EduYear)	.349	.122	.107	−.045	.016	−.349	1.000	1.000
PS	Zscores(age)	.640	.409	.399	.142	.022	.640	1.000	1.000
	Zscores (experience)	.519	.269	.257	−.115	.025	−.519	1.000	1.000
	Zscores (EduYear)	.643	.413	.403	−.143	.022	−.643	1.000	1.000

Chapter 5. Discussion

5.1. States and trends of FTK in Dengcen village

According to the results of intergenerational retention rate, cumulative retention rate, and the annual rate of change has been shown in the previous chapter; it is demonstrated that the retention of FTK has been eroded at an alarming pace. Relatively sharp declines occurred between the middle and the youngest generation, while declines between other two older generations are milder. Besides, it finds that declines of the PS component are always sharper than that of CK component. Overall, the changing direction of FTK is decreasing, and the sharpest reductions always occur within the youngest generation especially in PS component.

Looking at the annualized rate of each FTK domain in Dengcen village (Table 12), it is indicated that most of the sharpest declines occur within the youngest generation which underlines the results discussed above. Besides, when comparing two gender groups, sharp declines (over 1.5% per year) occurred more frequently within the youngest female respondents and the same trend of this age/gender group can be seen either in the results of intergenerational rate or cumulative rate. It can be explained by the noticeable changes of the young generation when comparing to the past, in particular, young women's lifestyle in China rapidly changed within recent decades. Especially along with the advocacy and popularization of gender equality, a great progress of girl's rights to receive education has been achieved and more and more women are able to get jobs in cities as men do. In present days, young women in China became more and more active in social events, diverse options rather than housewife are given when they deciding on occupation. Consequently, erosion of FTK retention between older and younger female is more significant than that of the male due to the changes of social roles of young women in China.

When discussing the retention of each secondary domain,

declines over 1.5% per year occurred more frequently in the CS domain, even within the middle generation. Craft skills require more study and practices than other skills. In fact, less and less local people in China are willing to spend long times to learn and practice craft skills instead of engaging other economic activities which can bring higher profits. Moreover, with the enormous development of commercialization and logistics in China, even rural people prefer buying requirements from outside rather than making by themselves. It is one of the reasons that the craft skills have been eroded severely from older generations to younger ones comparing to other domains of FTK.

5.2. Factors influencing FTK retention

Table 25 summarizes the results of analysis of gender, the experience of living in urban areas, education level, and generation that conducted in this study. All of four factors are demonstrated having influences to FTK retention as this study had assumed. These results overlap some of the explanatory factors proposed by Stanford Zent and Maffi (2009). It is easy to observe that different categories of FTK are affected by different contributory factors. However, there are lots of overlaps between age, experience, and education, which assume strong correlations between these three independent variables.

Table 25 Summaries of the results of analysis of each contributory factor

Contributory factors	Results of analysis	
	Components/domains with significant difference	Components/domains without significant difference
Gender	TOT, PS, CS	➢ CK component, ➢ All secondary domains of CK component, ➢ Secondary domains of PS component except for CS
Experience of living	➢ All components,	DF, WM, HF

in urban areas	➢ Secondary domains of CK component except for DF and WM, ➢ Secondary domains of PS component except for HF	
Education level	➢ All components, ➢ Secondary domains of CK component except for CR and WM ➢ Secondary domains of PS component except for HF and TA	CR, WM, HF, TA
Generation	➢ All components, ➢ Secondary domains of CK component except for WM ➢ All secondary domains of PS component	WM

5.2.1. Influences of gender

According to the Mann-Whitney U test results, male and female respondents' FTKAT scores have significant differences in TOT, the PS component (PS), and the Craft Skills domain belonging to PS component.

To explain the differences caused by gender, the gender perspective and its changing history in China should be discussed. In ancient China, there are two stages of gender culture: matriarchy and patriarchy. The gender culture of matriarchy was relatively equal from Upper Paleolithic to the early Neolithic; however, this equality was faded away after patriarchy had replaced matriarchy and male-dominated culture has become the mainstream of society (李春玲, 1996; 王瑞芹, 2007). From then on, series of gender

perspective, which are regarded as Chinese traditional gender perspective, had been established. To be brief, it is thought that men are physically stronger and intellectually superior to women. Thus, male superiority has been dominating people' s gender perspective for centuries. In such a context, women have less opportunity either to be educated or to have a career as men do. Gender role of women is relatively restricted.

Traditional practical skills in Dengcen village also represent the traditional gender perspective of China. In Dengcen village, men are responsible for the skills which are relatively technical and require more tutorial training, such as traditional architecture, and some of the craft skills like weaving rattan basket. On the contrary, women usually take charge of the skills that relatively less technical, time-consuming, and can be learned by observation, for example, weaving cotton cloths. For this reason, male and female respondents reasonably have significant differences on the scores of PS component, in particular, in the secondary domain of Craft Skills. Besides, the significant difference occurs in the scores of the TOT because of the great differences of practical skills.

Meanwhile, the significant difference did not occur in other domains of practical skills, which means the division of labor between men and women is relatively ambiguous in those categories. It could be explained that Dengcen village has a small population which might have caused a lack of labor force, which makes men and women working together for most of the practical skills.

5.2.2. Influences of experience of living in urban area

According to the Mann-Whitney U test results, significant differences between FTKAT scores of respondents who have or have no experience of living in urban area occurred in all components and secondary domains except DF domain and WM domain of the CK component, and HF domain of the PS component.

Significant differences occur in most of the categories of FTK

means that the experience of living in urban areas has a noticeable impact on FTK retention. Along with the development of industrialization in China, increased demand for labor force has been caused by the industrialization. More and more factories have been recruiting a large number of low-wage workers since the last couple of decades. Thus, migrant workers from rural areas are making up more than one-third of the entire working population. Meanwhile, industrialization has been pushing the development of urbanization in China. With more and more urban population, infrastructure in cities has been improved and this has brought great convenience to urban people. Owing to the higher incomes and more benefits of life, rural people, especially young people prefer to seek for opportunities of working or studying in cities.

Influences of the experience of living in urban areas can be summarized as two aspects. On one hand, rural people who are working or studying in cities have less time to stay in their home villages. Therefore, they have fewer opportunities to participate the traditional events and works than people who had never live in urban area. On the other hand, lifestyle, life skills, and perceptions of forests of people who have previously lived or are currently living in urban areas might have been changed due to the inexperience with urban living environments. Accordingly, FTK possessed by them should vary from that possessed by those who have never left the rural area.

Nonetheless, no significant difference was found in the scores of DF domain, WM domain, and HF domain. The former two domains of traditional conceptual knowledge can be interpreted as a common sense of the traditional knowledge system of Dengcen village that has been rooted in their culture. People acquire these kinds of knowledge by oral or by observation at their early age and may have a stronger memory of them. On the contrary, hunting and fishing skills are not necessary skills for survival in Dengcen village. Respondents who are a well experienced hunter or fisher consider hunting and fishing as their hobby rather than vocational skills. In other words, there is no inevitability that people who have

experience of living in urban areas are more or less experienced in hunting and fishing. Similarly, there is a very slight increase in HF domain within the middle-aged male group when compared with their fathers (Table 12) which confirm that hunting and fishing skills have a different pattern from other categories of FTK.

5.2.3. Influences of education level

According to the results of one-way ANOVA, significant differences occurred among the group of respondents who have junior school or higher education and the other two groups in TOT, CK component, and also PS component. For the secondary domains, the group of junior or higher education is significantly different with other two groups in most of the domains, except for the CR domain, WM domain, HF domain, and TA domain.

Understanding the results, educational scheme and educational situation in China can help this result be meaningfully interpreted. Compulsory education in China has been developed since the early 1950s after the establishment of People's Republic of China (PRC). From then on, the educational scheme in China has been mainly focusing on moral education, intellectual education, and physical education(王炳照, 2009). The modern education system in China has been concentrating more on contemporary knowledge since last few decades; thus, students can rarely learn traditional knowledge and practice the traditional skills in the public education systems.

Even though Chinese government had made great efforts for the popularization of compulsory education, however, education resources are mainly allocated in urban areas, particularly high schools and colleges. People who received a higher education have more experience of living in urban area, which have exerted significant influence over FTK as discussed above. Moreover, those who are more educated may have more opportunities to various occupations instead of engaging agriculture. All of these situations may change people's perception toward forests, and even their own culture. Lack of study and practice of FTK, as well as changed

perception of FTK, may lead to the different retention rate of FTK.

However, not every category of FTK is affected by education level. As mentioned, knowledge of watershed management belongs to the common sense of Dengcen people' s culture thus it is relatively less fragile than other types of conceptual knowledge. Also, hunting and fishing skills are more like a hobby of Dengcen people so that it is less affected by one' s education level.

Customs and rituals represent the essence of Dengcen a person's or even Dong ethnic people's culture. People who are more educated have fewer opportunities to practice the knowledge; however, they may have a stronger awareness of their own culture and also stronger willingness to protect it as they might have been taught about the importance of it.

Traditional architecture is a technique that requires very strict conditions on teaching and learning. It depends on individuals' interests and talent in mathematics and architecture. Only a few male members can get the opportunities to learn traditional architecture techniques from the elders. In Dengcen village, outstanding architects are educated at different levels which can explain that knowledge of TA affected a little by respondents' education level.

5.2.4. Influences of age

According to the results of one-way ANOVA, significant differences occurred between the youngest generations and other two elder generations in the total scores of the test and the scores of PS component. Different to the results of education level, the oldest generation is demonstrated to be significantly different to other two younger generations in the scores of CK component. It can be explained that conceptual knowledge of FTK had greater change decades ago and had become more stable during recent years.

When looking at the secondary domains, it is found that situation of FTK retention influenced by age is more complicated

than it influencing by education level. In most of the secondary domains, significant differences occurred between the youngest generation and other two elder generations. However, significant differences were found only between the oldest and the youngest generation in CR domain, PI domain, CS domain, and HF domain. Moreover, differences between each generation are demonstrated insignificant in WM domain while each generation is significantly different from others in AS domain.

The complexity of the results can be attributed to the elaborate influences of age. People who were born in different periods of society had grown up in different social environments which are consisted with different levels of economic development, education popularization, urbanization, and industrialization. Various social environments might have shaped people's worldviews in a different way. For instance, younger people are generally considered to be more open-minded – particularly in gender perspective – than their elders because they are grown up in a more developed society which provides them opportunities to widen their horizon (贾云竹, 马冬玲, 2015; 许琪, 2016). People at different age may have different experience and education levels according to the stages of development in a country. Therefore, FTK that possessed by people of different ages are affected by both of these factors or even more factors unknown. It is also demonstrated by the Stepwise Regression that age is the factor with most explanation ability to FTK retention in this study.

Focusing again on the results, WM domain as the only domain that does not have any significant difference between each generation indicates that the knowledge of watershed management belongs to a common sense of Dengcen people's knowledge system, which has been demonstrated in the analysis of experience and education level. On the other hand, AS is the only domain in which significant difference occurred between each generation. It is because agroforestry as the fundamental source of income of Dengcen people, skills of agroforestry are also tightly interwoven in their daily life. This makes retention of FTK in the form of

agroforestry skills the most sensitive to the influence of age.

5.3. Suggestions for FTK retention

In this study, measures at both local and government level that can potentially help the FTK to be maintained will be discussed.

5.3.1. Suggestions at local level

As discussed above, people who have experience of living in urban areas have fewer opportunities to participate traditional events and works. Accordingly, the opportunities for them to practice FTK are decreased. Thus, education of FTK is important and essential before one is leaving the village for study and jobs. Children spend much time in the school nearby the village during the semester and stay with their families in the village during vacation. Therefore, education from both teachers and villagers are necessary. During the survey, there was some evidence showing efforts of school and villagers to educate their children about their traditional knowledge, including FTK. Outside the Dimen primary school in the next village, there are some drawings of FTK of the local community (Figure28). Children's perception toward FTK may imperceptibly affected by this kind of visual stimulus rooted in their daily life. Besides, adults who return home for vacation, particularly undergraduate students, were spontaneously teaching the children their traditional songs and dance. Through observations in the village, it is found that most of the children are willing to learn. One of the reasons can be inferred that there is not much entertainment in the village, singing and dancing became one of the main entertainments during holidays. Being inspired by these evidences, it is thought that FTK education program that targets children and teenagers is feasible in Dengcen village. During the program, adults who volunteered to teach will be given some training lessons about teaching FTK in advanced. Experts will provide them some useful skills of both FTK and education, and also learning materials like a handbook. After the training lesson for the teachers, they are taking charge of teaching

FTK to children and teenagers. Within the class, experts can observe and help the program to be smoothly completed. The FTK education program takes place during the summer and winter vacation thus students can easily participate in it.

(A)

(B)

Figure 28 Education of FTK in Dengcen village (A) Drawings of FTK outside the school. (B) Children learning traditional songs from adult

In addition to the training program, community-based ecotourism is another solution at local level thought to help revive FTK in Dengcen village. By the time of the second survey was ended in January 2017, several young villagers were preparing a youth hostel as well as a showroom for traditional cultures built by themselves. This business, proposing by a few young men in Dengcen village, is now getting partial financial assistance from government according to one of the shareholders. They were looking forward to opening the youth hostel to tourists by the end of this year. However, there are still many difficulties for them to operate and manage the business since they do not have much

knowledge about business and only limited counseling they can get from outside. At any rate, it seems to be a great step for the villagers to set up their own business in the village. It will probably become an attraction in the future for young people to stay and work in the village instead of in a strange place far away from home. Moreover, this business can somehow contribute to the conservation of FTK as well as ecotourism in Dengcen village as they are planning to introduce and commercialize their traditional knowledge to the tourists through this youth hostel. Based on the youth hostel business founded by the young villagers, culture-based ecotourism program can be developed and introduced to those who stay in the hostel. To be specific, this program should include at least a course of community-based ecotourism in Dengcen, a menu of original local foods, an experience of traditional skills, participation in traditional songs and dancing performance. Such a program is based on the active involvement of local people. At the same time, local people can get income from this program through the youth hostel. Nevertheless, considering some examples of failure in eco-museum in Southwest China (旷宗仁, 赵锦辉, 2014; 尹绍亭, 2009), it is challenging to promote ecotourism in Dengcen village without jeopardizing its original landscape, culture, and local people's traditional lifestyle.

5.3.2. Suggestions at government level

Solutions at government level are suggested according to the impact of demographic and socio-economic factors on FTK retention determined in this study as well as solutions suggested in previous researches of FTK.

Refined education systems with concerns for local traditional knowledge are needed. Similar to promoting FTK training program mentioned above, local FTK lectures should be given to students as a component of compulsory education. In boarding schools, students have little chance to participate traditional event in their home villages. For instance, children in Dengcen village have to leave

home and stay in boarding schools located far from their village since middle school. For this reason, experience program and seasonal events during the busy season in farming, or traditional festival of local ethnic groups should be held in schools to help students experience and practice FTK.

Another government level solution suggested in this study is a policy of culture diversity conservation in China. One of the approaches is constructing an FTK database in China. This database should include all the FTK possessed by every local community or ethnic groups in China and classified into layers like the FTK local domains that used in this study. There is a precedent in India called Traditional Knowledge Digital Library (TKDL) (张逸雯, 宋歌, 2014). This approach can also involve intellectual property of FTK, which is a legal approach to culture diversity conservation. In addition, a supportive policy of local cultural industry, for example, culture-based ecotourism mentioned above, should be developed and implemented. In fact, Ministry of Environmental Protection of China has released the <Technical regulation for classification, investigation, and inventory of traditional knowledge relating to biological diversity> in 2014("Technical regulation for classification, investigation, and inventory of traditional knowledge relating to biological diversity," 2014). Although it is a trial regulation, however, it can be the technical foundation and reference source of FTK database in the future.

Chapter 6. Conclusion

6.1. Findings

This study conducted VITEK methodology to understand the status and trends of FTK retained by local people and aimed to identify demographic and socio-economic factors that might have affected FTK retention. It is the first practice of VITEK methodology in the field in China, which may contribute to both the improvement of VITEK methodology and FTK study in China.

According to the results, this study demonstrated an erosion of FTK within a local community of southwest China. Similar status and trends of TEK have been reported by a pilot study of VITEK methodology conducted in Chuao, Venezuela (Zent and Maffi, 2012), and by a previous research conducted in Yunnan province, China (Z. Yuan et al., 2014). The sharp declines and a long-standing erosion of FTK have been indicated in this study should raise concern.

Through the statistical analysis conducted by this study, several demographic and socio-economic factors were identified as contributory factors to FTK retention. These factors are age, gender, the experience of living in urban area, and education level, which confirm to the explanatory variables of TEK variation and change proposed by Stanford Zent and Maffi (2009). Furthermore, a refined empirical framework of FTK research has been established and it is able to be used in further researches.

Based on the situation of FTK and the factors influencing FTK retention, this study suggested that FTK education program and culture-based ecotourism dominated by local people as local solutions for FTK retention. Besides, solutions at government level such as refined education system and cultural diversity protection policy are also suggested in this study.

6.2. Study limitations

As the first practice of VITEK methodology in China, study

limitations of this study were caused by inadequate preparation and force majeure. First of all, the sample size of this study was limited because of the small population of Dengcen village. Second, there was difficulty of meeting young adult who were working or studying in urban areas. To keep populations of each age/gender group equal, the total sample size was decided by the limited population of the youngest generation. Third, limited duration of survey as this study is being short of fund. For this reason, field survey was completed by two times. Forth, there were language barrier when communicating with some respondents, particularly the elders who cannot use Mandarin Chinese but only Dong language. Although several local young people had helped to translate during the conversations, however, there should have remained mistranslations. Fifth, this study ignored some disadvantages and limitations from VITEK methodology as well as statistical analysis. Last but not least, only four factors were examined and discussed by this study, results of FTK retention given by this study might be influenced by unknown variables.

Bibliography

Bennett, J. W. (1976). *The ecological transition*: Transaction Publishers.

Berkes, F. (2012). *Sacred ecology* (3rd ed.): Routledge.

Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological applications, 10*(5), 1251-1262.

Boafo, Y. A., Saito, O., Kato, S., Kamiyama, C., Takeuchi, K., & Nakahara, M. (2015). The role of traditional ecological knowledge in ecosystem services management: the case of four rural communities in Northern Ghana. *International Journal of Biodiversity Science, Ecosystem Services & Management, 12*(1-2), 24-38. doi:10.1080/21513732.2015.1124454

Cheng, G., Wang, C., & Xue, D. (2012). Attitude to the traditional knowledge of international governmental organizations and suggested strategies of China. *Biodiversity Science, 20(4)*, 501-511.

Cheng, Z. (2006). Study of Laws and Policies of ASEAN Concerning Protection of Traditional Intellectual Properties. *Journal of Guangxi Normal University: Philosophy and Social Sciences Edition, 42(2)*, 31-33.

Chinese Traditional Villages Catalog. (2012). Retrieved from http://www.chuantongcunluo.com/Gjml.asp?id=585&page=7

Chun, Y. W., & Tak, K.-I. (2009). Songgye, a traditional knowledge system for sustainable forest management in Choson Dynasty of Korea. *Forest Ecology and Management, 257*(10), 2022-2026. doi:10.1016/j.foreco.2008.11.038

Cooper, D. (2010). Indigenous Knowledge and Sustainable Forest Management in Chile. *World Forestry-FOR, 595*.

Crews, J. (2003). Forest and tree symbolism in folklore. *UNASYLVA-FAO-*, 37-37.

Farooquee, N. A., Majila, B., & Kala, C. (2004). Indigenous knowledge systems and sustainable management of natural

resources in a high altitude society in Kumaun Himalaya, India. *Journal of Human Ecology, 16*(1), 33-42.

Kong, J., & Yu, H. (2009). A Primary Probing into the Protection of Akha's Traditional Knowledge in Thailand. *Around Southeast Asia, 2009(8)*, 33-36.

Krishna, P. O., Wu, N., Zhang, Y., Lv, X., Fang, Z., & Xu, Q. (2014). Access to Genetic Resources and Benefit Sharing: Opportunities and Challenges in the Hindu Kush Himalayan Region. *Sichuan Environment, 33(2)*, 37-42. doi:10.14034/j.cnki.schj.2014.02.027

Liu, J., Zhang, R., & Zhang, Q. (2012). Traditional forest knowledge of the Yi people confronting policy reform and social changes in Yunnan province of China. *Forest Policy and Economics, 22*, 9-17.

MEA. (2005). Ecosystems and human well-being: desertification synthesis.

Molintas, J. M. (2004). The Philippine indigenous peoples' struggle for land and life: challenging legal texts. *Ariz. J. Int'l & Comp. L., 21*, 269.

Mukenge, T. (2002). Culture and Customs of the Congo.

Netting, R. M. (1974). Agrarian ecology. *Annual Review of Anthropology, 3*(1), 21-56.

Nimachow, G., Joshi, R., & Dai, O. (2011). Role of indigenous knowledge system in conservation of forest resources-A case study of the Aka tribes of Arunachal Pradesh. *Indian Journal of Traditional Knowledge, 10(2)*, 276-280.

Parotta, J. A., Liu, J., & Sim, H.-C. (2008). *Sustainable forest management and poverty alleviation: Roles of traditional forest-related knowledge*.

Parrotta, J. A., Lim, H.-F., Liu, J., Ramakrishnan, P. S., & Youn, Y.-C. (2009). Traditional forest-related knowledge and sustainable forest management in Asia. *Forest Ecology and Management, 257*(10), 1987-1988. doi:10.1016/s0378-1127(09)00221-7

Parrotta, J. A., & Trosper, R. L. (2011). *Traditional forest-related*

knowledge: sustaining communities, ecosystems and biocultural diversity (Vol. 12): Springer Science & Business Media.

Parrotta, J. A., Youn, Y.-C., & Camacho, L. D. (2016). Traditional knowledge for sustainable forest management and provision of ecosystem services. *International Journal of Biodiversity Science, Ecosystem Services & Management, 12*(1-2), 1-4. doi:10.1080/21513732.2016.1169580

Ramakrishnan, P. S., Rao, K. S., Chandrashekara, U. M., Chhetri, N., Gupta, H. K., Patnaik, S., . . . Sharma, E. (2011). South Asia. In J. A. Parrotta & R. L. Trosper (Eds.), *Traditional Forest-Related Knolwedge: Sustaining coummunities, Ecosystems and Biocultural Diversity* (pp. 332-333): Springer.

Siahaya, M. E., Hutauruk, T. R., Aponno, H. S. E. S., Hatulesila, J. W., & Mardhanie, A. B. (2016). Traditional ecological knowledge on shifting cultivation and forest management in East Borneo, Indonesia. *International Journal of Biodiversity Science, Ecosystem Services & Management, 12*(1-2), 14-23. doi:10.1080/21513732.2016.1169559

Sirait, M., Prasodjo, S., Podger, N., Flavelle, A., & Fox, J. (1994). Mapping customary land in East Kalimantan, Indonesia: a tool for forest management. *Ambio*, 411-417.

Teather, E. K., & Chow, C. S. (2000). The Geographer and the Fengshui Practitioner: so close and yet so far apart? *Australian Geographer, 31*(3), 309-332.

Technical regulation for classification, investigation, and inventory of traditional knowledge relating to biological diversity. (2014). Retrieved from http://kjs.mep.gov.cn/hjbhbz/bzwb/stzl/201406/t20140606_276594.shtml

Turnbull, C. (2015). *The forest people*: Random House.

Vogt, K. A., Honea, J. M., Vogt, D. J., Patel-Weynand, T., Edmonds, R. L., Sigurdardottir, R., . . . Andreu, M. G. (2006). Global societies and forest legacies creating today's forest landscapes. *Forests and society: sustainability and life cycles*

of forests in human landscapes, pp.30–59.

Youn, Y.–C. (2009). Use of forest resources, traditional forest–related knowledge and livelihood of forest dependent communities: Cases in South Korea. *Forest Ecology and Management, 257*(10), 2027–2034. doi:10.1016/j.foreco.2009.01.054

Youn, Y.–C., Liu, J., Sakuma, D., Kim, K., Masahiro, I., Shin, J.–H., & Yuan, J. (2011). Northest Asia. In J. A. Parrotta & R. L. Trosper (Eds.), *Traditional Forest–Related Knowledge: Sustaining conmmunities, Ecosystems and Biocultural Diversity* (pp. 304–305): Springer.

Yuan, J., & Liu, J. (2009). Fengshui forest management by the Buyi ethnic minority in China. *Forest Ecology and Management, 257*(10), 2002–2009. doi:10.1016/j.foreco.2009.01.040

Yuan, J., & Niehof, A. (2011). Agricultural technology extension and adoption in China: A case from Kaizuo township, Guizhou province. *The China Quarterly, 206*, 412–425.

Yuan, Z., Lun, F., He, L., Cao, Z., Min, Q., Bai, Y., . . . Fuller, A. (2014). Exploring the State of Retention of Traditional Ecological Knowledge (TEK) in a Hani Rice Terrace Village, Southwest China. *Sustainability, 6*(7), 4497–4513. doi:10.3390/su6074497

Zent, S., & Maffi, A. (2012). Vitality Index of Traditional Environmental Knowledge. An Introductory guide: Canada: Terralingua, Unity in biocultural diversity.

Zent, S., & Maffi, L. (2009). Final report on indicator No. 2: methodology for developing a vitality index of traditional environmental knowledge (VITEK) for the project Global Indicators of the Status and Trends of Linguistic Diversity and Traditional Knowledge. *Global indicators of the status and trends of linguistic diversity and traditional knowledge. Canada: Terralingua*.

贾云竹, 马冬玲. (2015). 性别观念变迁的多视角考量: 以“男主外, 女主内”为例. *妇女研究论丛*(3), 29–36.

古开弼. (2004). 民间规约在历代自然生态与资源保护活动中的文化传承.

北京林业大学学报: 社会科学版, 3(3), 20-25.

旷宗仁, 赵锦辉. (2014). 乡土农业知识的现有保护方法探讨. *云南民族大学学报(哲学社会科学版), 31(5)*, 77-83. doi:10.13727/j.cnki.53-1191/c.2014.05.011

贵州省2016年人力资源和社会保障事业统计公报. (2016). Retrieved from http://gz.hrss.gov.cn/art/2017/6/26/art_1143_42107.html

代峰. (2002). 荀子自然观的生态启悟. *黄河科技大学学报, 4*(3), 81-85.

赖庆奎, 刘斌, 陈羞莎. (2013). 高黎贡山北段傈僳族森林传统知识浅析. *绿色科技*(10), 266-268.

刘金龙, 张明慧, 和志鹏, 谷莘. (2013). 重构森林传统知识和文化. *绿叶, 1*, 152-158.

刘胜祥, 胡秀云. (1998). 我国古代森林自然保护区管理制度初探. *植物科学学报, 16*(4), 376-378.

李春玲. (1996). 性别观念与中国社会科学院女性的职业发展. *社会学研究*(2), 48-59.

施晓春, 周鸿. (2003). 神山森林传统的传承与社区生态教育初探. *思想战线, 29*(1), 51-54.

杨京彪, 郭泺, 成功, 薛达元. (2014). 哈尼族传统林业知识对森林生物多样性的影响与分析. *云南农业大学学报(自然科学), 29*, 307-314.

杨宗亮. (2005). 云南壮族的自然崇拜及其对生态保护的意义. *云南民族大学学报: 哲学社会科学版, 22*(2), 53-56.

王炳照. (2009). 传承与创新——从新民主主义教育方针到社会主义教育方针. *北京大学教育评论*(1), 70-82.

王瑞芹. (2007). 性别文化发展的历史考察. *中華女子學院學報, 19*(4), 63-67.

尹绍亭. (2009). 生态博物馆: 想说爱你不容易. *中国民族报, 5*.

张钧成. (1988). 关于中国古代林业传统思想的探讨. *北京林业大学学报(社会科学版)*, 29-39.

张逸雯, 宋歌. (2014). 印度传统知识图书馆(TKDL)编制技术分析及对中医药传统知识保护的启示. *世界中医药, Vol 9, No. 12*, 1669-1671.

전경수. (1997). *환경 친화의 인류학*: 서울: 일조각.

齐冬莲, 张敏, 谢翠蓉. (2010). 老子自然哲学观中的生态伦理意蕴. *湖南大學學報 (社會科學版), 24*(6), 127−130.

钟年. (1994). 置于时空流中的自然崇拜——《中国自然神与自然崇拜》读后. *民族研究*(2), 61−63.

邹莉, 谢宗强, 欧晓昆. (2005). 云南省香格里拉大峡谷藏族神山在自然保护中的意义. *生物多样性, 13*(1), 51−57.

何星亮. (1992). *中国自然神与自然崇拜*: 上海三联书店.

许琪. (2016). 中国人性别观念的变迁趋势, 来源和异质性——以 “男主外, 女主内” 和 “干得好不如嫁得好” 两个指标为例. *妇女研究论丛*(3), 33−43.

Appendix I

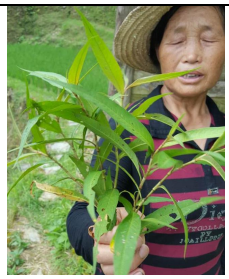
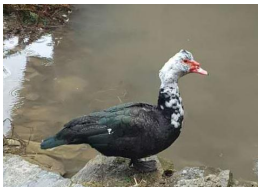
The FTK Aptitude Test for Dengcen people

Conceptual knowledge component

	Questions	Answers	Points
Religious Beliefs (RB)			
1	Cutting old trees (meix laox) in the village is forbidden because they are sacred?	a. yes	1
		b. no	0
2	Do you know about the custom that people regard old trees (meix laox) as godfather / godmother? Have you ever experienced or believed in it?	a. yes, I have experienced or believed in it	2
		b. yes, but I didn't experience or believe in it	1
		c. no, I had never heard about it	0
3	Do you know about the custom that people building bridges (jiuc) by timber piles? Have you ever experienced or believed in it?	a. yes, I experienced or believed in it	2
		b. yes, but I didn't experience or believe in it	1
		c. no, I had never heard about it	0
4	Do you know about the custom that people hanging talisman made by bark paper (jis sal)? Have you ever experienced or believed in it?	a. yes, I experienced or believed in it	2
		b. yes, but I didn't experience or believe in it	1
		c. no, I had never heard about it	0
5	Do you know about the taboo that digging in the sacred mountain is forbidden?	a. yes	1
		b. no	0
6	Do you know about the taboo that cutting trees nearby the village is forbidden?	a. yes	1
		b. no	0
7	What patterns are usually embroidered on traditional costume?	a. livestock	0
		b. plants, wildlife, and mythical creatures	1
		c. names	0
8	Do you know the location of Yew Spring?	a. yes	1

		b. no	0
9	Do you know the location of Root Gate?	a. yes	1
		b. no	0
10	Do you know the location of the granaries?	a. yes	1
		b. no	0
11	Do you know the location of the Drum Tower?	a. yes	1
		b. no	0
12	Do you know the region of the sacred mountain?	a. yes	1
		b. no	0
13	Which animal is relevant to the Siyueba Festival (siik nguedx beds)?	a. pig	0
		b. dog	0
		c. cow	1
		d. sheep	0
14	Is it Liuyueliu Festival (liogc nguedx liogc) the day that Dragon King drying his robe according to the myth?	a. yes	1
		b. no	0
Customs and Rituals (CR)			
15	Is there a tradition that eating Zongzi during Liuyueliu Festival (liogc nguedx liogc)?	a. yes	1
		b. no	0
16	Which kind of wine is smeared on the body or spill in the house on Dragon Boat Day (ngox nguedx ngox)?	a. corn wine (kaot oux)	0
		b. rice wine (kaot oux jos)	0
		c. grassroots realgar wine (jang jox)	1
		d. ginger wine	0
17	Is it the traditional food of Sanyuesan Festival (samp nguedx samp) relevant to sugar cane?	a. yes	1
		b. no	0
18	Is it colored rice (oux naeml) the traditional food of Siyueba Festival?	a. yes	1
		b. no	0
19	Does Caigetang (xait dangc) traditionally take place in Drum Tower (gux louc)?	a. yes	1
		b. no	0
20	Is the traditional cotton cloth (jal gaeml) needed when holding a funeral?	a. yes	1
		b. no	0
21	Is coffin (beens) traditionally made by cedar?	a. yes	1
		b. no	0
22	Is the bark paper (jis sal) needed when holding a funeral?	a. yes	1
		b. no	0
23	Which plant should be put on your head	a. rattan	0

	when holding funeral for your relative?	b. bamboo	0
		c. flax (ganl)	1
		d. cedar leaves (beens)	0
Customary Laws and Village Regulations (CV)			
24	Did people consult the elders of the village (nyenc laox) when holding events or making decisions?	a. yes	1
		b. no	0
25	Are the village regulations handed down from your ancestors?	a. yes	1
		b. no	0
26	Which behavior should be punished according to the village regulations?	a. cutting private forests for private use	0
		b. cutting forests owned by others for private use	0
		c. collecting vegetables in the farm planted by others	0
		d. collecting wild herbs in the farm owned by others	1
Forests Rights (FR)			
27	In old days, a farm can be possessed by whoever first reclaims it?	a. yes	1
		b. no	0
28	Is it illegal that collecting herbs for medical use in the forests owned by others according to the village regulations?	a. yes	1
		b. no	0
Plant Identification (PI)			
29	Is it a cedar (beens) in this picture? 	a. yes	1
		b. no	0

30	Is it the plant called Bamai in this picture? 	a. yes	1
		b. no	0
31	Can the plant in this picture dye cloths? 	a. yes	1
		b. no	0
Animal Identification (AI)			
32	Is it a Hanya in this picture? 	a. yes	1
		b. no	0
33	Do you know about the food habit of wild boar?	a. yes	1
		b. no	0
34	Do you know how do people call the insect in this picture? 	a. yes, Nia (Gom)	1
		b. yes, (wrong name)	0
		c. no, I don't know its name	0
Disaster Forecast (DF)			
35	Unusually lots of moth flying around lights predicts what natural disaster?	a. drought (liagx)	0
		b. rainstorm (bienl, naemx laoh)	1
		c. earthquake	0
		d. wildfire	0
Watershed Management (WM)			

36	Where does irrigating water in rice fields come from?	a. river	0
		b. well	0
		c. water flow down from mountain	1
		d. tap water	0
37	Do you understand how the influent and effluent water works in rice fields?	a. yes	1
		b. no	0
Total Scores			40

Practical Skills Component
(Female version)

	Questions	Answers	Points
Agroforestry Skills (AS)			
1	When does farming (kaik yav) start in a year?	a. Luna December to January	0
		b. Luna February to March	1
		c. Luna May to June	0
		d. Luna July to August	0
2	How often do you take part in Kai Tian (keik yav)?	a. every year	2
		b. sometimes	1
		c. never	0
3	Can you describe the procedures of Kai Tian (keik yav)in detail?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
4	Have you ever planted a tree (dos meix)?	a. yes, I plant trees frequently	2
		b. yes, occasionally	1
		c. no, I had never plant a tree	0
5	Do you know what is it used for? Have you ever used it?	a. it's for lighting and I had used it before.	2
		b. it's for lighting but I had never used it	1

		c. I don't know what is it	0
6	What material is usually used to build a house? Why?	a. cedar, because the timber is strong and straight	2
		b. cedar, but I cannot tell the reason	1
		c. I don't know what it is	0
7	How did people get seedlings during the old days?	a. they nurture from mother trees by branches or seeds	2
		b. they somehow get seedlings from nature	1
		c. they purchase seedlings	0
8	What's the major function of herb called Yiduoyun?	a. treating a cold	1
		b. treating diarrhea	0
		c. treating vomit	0
		d. stop bleeding	0
9	What is the flower in this picture? Is it edible? 	a. it's Huanghua, and it's edible	2
		b. it's Huanghua / it's edible	1
		c. I don't know neither its name or edibility	0
10	Can you describe the usage and function of the herb called "Zum"?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
Craft Skills (SC)			
11	Have you ever made bark papers	a. yes, I make bark	2

	(jis sal)? If yes, how often do you make bark papers?	papers frequently	
		b. yes, but I rarely make it	1
		c. no, I had never made bark papers	0
12	What are the traditional materials for bark papers (jis sal)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
13	Can you describe the procedures of making bark papers (jis sal)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
14	Can you describe the main traditional functions of bark papers (jis sal)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
15	Have you ever dyed traditional cloths (yaems yal)? If yes, how often do you dye cotton cloths (jal gaeml)?	a. yes, I dye cloths frequently	2
		b. yes, but I rarely dye cloths	1
		c. no, I had never dyed cloths	0
16	Can you describe the procedures of dying traditional cloths (yaems yal)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
17	Have you ever weaved cotton cloths? If yes, how often do you weave cotton cloths?	a. yes, I weave cotton cloths frequently	2
		b. yes, but I rarely weave cotton cloths	1
		c. no, I had never weave cotton cloths	0
18	Can you describe the main sources of cotton during the old days?	a. comprehensive answer	2
		b. answer with little	1

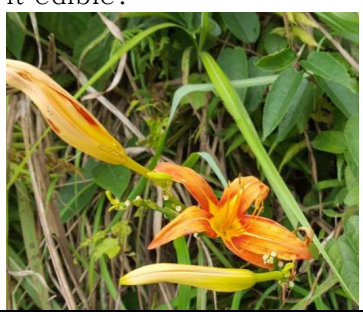
		details	
		c. cannot tell any details	0
19	Have you ever embroidered on traditional costumes? If yes, how often do you embroider?	a. yes, I embroider frequently	2
		b. yes, but I rarely embroider	1
		c. no, I had never embroidered	0
Traditional Food Preparation and Process (TF)			
20	Have you ever dyed sticky rice? If yes, how often do you dye sticky rice?	a. yes, I dye sticky rice frequently	2
		b. yes, but I rarely dye sticky rice	1
		c. no, I had never dyed sticky rice	0
21	What are the traditional materials for dyed sticky rice in different colors?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
22	Can you describe the procedures of dying sticky rice?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
23	Have you ever made traditional wine (nyangh taot)? If yes, how often do you make traditional wine?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0
24	Can you describe the procedures of making traditional wine (nyangh taot)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
25	What material is traditionally used to wrap a Zongzi (siic beev)?	a. bamboo leaves (bav oax siic)	1
		b. rattan	0

		c. cedar leaves	0
		d. bark	0
26	Have you ever made a Zongzi (siic beev)? If yes, how often do you make a Zongzi?	a. yes, I make Zongzi every year	2
		b. yes, but I rarely make Zongzi	1
		c. no, I had never made Zongzi	0
27	Have you ever made a Tian Ba (siic kuanp)? If yes, how often do you make a Tian Ba?	a. yes, I make Tian Ba every year	2
		b. yes, but I rarely make Tian Ba	1
		c. no, I had never made Tian Ba	0
28	What material brings sweet taste in Tian Ba?	a. sugar	0
		b. sweet cane (jaol dangc)	1
		c. honey	0
		d. sauce	0
29	Have you ever made Tian Xi Fan (geengl kuanp)? If yes, how often do you make Tian Xi Fan?	a. yes, I make Tian Xi Fan every year	2
		b. yes, but I rarely make Tian Xi Fan	1
		c. no, I had never made Tian Xi Fan	0
30	What material brings sweet taste in Tian Xi Fan (geengl kuanp)?	a. sugar	0
		b. sweet cane	1
		c. honey	0
		d. sauce	0
31	Have you ever cured meat (bal wedl) or fish (bal sernt)? If yes, how often do you cure meat or fish?	a. yes, I make cured meat or fish frequently	2
		b. yes, but I rarely cure meat or fish	1
		c. no, I had never cured meat or fish	0
32	How long it takes for cured meat (bal wedl) or fish (bal sernt) to be edible?	a. half day	0
		b. couple of days	0
		c. from a few weeks to months	1
		d. more than one year	0
Hunting and Fishing Skills (HF)			
33	Have you ever fished (dos bal)? If yes, how often do you fish?	a. yes, I go fishing frequently	2

		b. yes, but I rarely go fishing	1
		c. no, I had never fished	0
Total Scores			60

(Male version)

	questions	answers	points
Agroforestry Skills (AS)			
1	When does farming (kaik yav) start in a year?	a. Luna December to January	0
		b. Luna February to March	1
		c. Luna May to June	0
		d. Luna July to August	0
2	How often do you take part in Kai Tian (keik yav)?	a. every year	2
		b. sometimes	1
		c. never	0
3	Can you describe the procedures of Kai Tian (keik yav) in detail?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
4	Have you ever planted a tree (dos meix)?	a. yes, I plant trees frequently	2
		b. yes, occasionally	1
		c. no, I had never plant a tree	0
5	Do you know what is it used for? Have you ever used it? 	a. it's for lighting and I had used it before.	2
		b. it's for lighting but I had never used it	1
		c. I don't know what is it	0
6	What material is usually used to build a house? Why?	a. cedar, because the timber is strong and	2

		straight	
		b. cedar, but I cannot tell the reason	1
		c. I don't know what it is	0
7	How did people get seedlings during the old days?	a. they nurture from mother trees by branches or seeds	2
		b. they somehow get seedlings from nature	1
		c. they purchase seedlings	0
8	What's the major function of herb called Yiduoyun?	a. treating a cold	1
		b. treating diarrhea	0
		c. treating vomit	0
		d. stop bleeding	0
9	What is the flower in this picture? Is it edible? 	a. it's Huanghu, and it's edible	2
		b. it's Huanghua / it's edible	1
		c. I don't know neither its name or edibility	0
10	Can you describe the usage and function of the herb called "Zum"?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
Craft Skills (CS)			
11	Have you ever weaved a rattan basket (yuh)? If yes, how often do you weave a rattan basket?	a. yes, I weave rattan baskets frequently	2
		b. yes, but I rarely weave rattan baskets	1
		c. no, I had never weave a rattan basket	0
12	Can you describe the procedures of weaving a rattan basket (yuh)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any	0

		details	
13	Have you ever dyed traditional cloths (yaems yal)? If yes, how often do you dye cotton cloths?	a. yes, I dye traditional cloths frequently	2
		b. yes, but I rarely dye traditional cloths	1
		c. no, I had never dye traditional cloths	0
14	Can you describe the procedures of dying traditional cloths (yaems yal)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
Traditional Food Preparation and Process (TF)			
15	Have you ever made traditional wine (nyangh taot)? If yes, how often do you make traditional wine?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0
16	Can you describe the procedures of making traditional wine (nyangh taot)?	a. comprehensive answer	2
		b. answer with little details	1
		c. cannot tell any details	0
17	What material is traditionally used to wrap a Zongzi (siic beev)?	a. bamboo leaves (bav oax siic)	1
		b. rattan	0
		c. cedar leaves	0
		d. bark	0
18	What material brings sweet taste in Tian Ba (siic kuanp)?	a. sugar	0
		b. sweet cane	1
		c. honey	0
		d. sauce	0
19	What material brings sweet taste in Tian Xi Fan (geengl kuanp)?	a. sugar	0
		b. sweet cane (jaol dangc)	1
		c. honey	0
		d. sauce	0

20	How long it takes for cured meat (bal wedl) or fish (bal sernt) to be edible?	a. half day	0
		b. couple of days	0
		c. from a few weeks to months	1
		d. more than one year	0
Traditional Architecture (TA)			
21	Have you ever built a traditional house? If yes, how often do you build a traditional house?	a. yes, I build traditional houses frequently	2
		b. yes, but I rarely build traditional houses	1
		c. no, I had never build a traditional house	0
22	Can you design a traditional house or do you know the architectural principle of it?	a. yes, I can design / I know the design principle very well	2
		b. yes, but not very well / it takes more practices	1
		c. no, I cannot / I don't know	0
23	Have you ever built a granary (sox oux)? If yes, how often do you build a granary?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0
24	Can you design a granary (sox oux) or do you know the architectural principle of it?	a. yes, I can design / I know the design principle very well	2
		b. yes, but not very well / it takes more practices	1
		c. no, I cannot / I don't know	0
25	Have you ever built a drum tower (gux louc)? If yes, how often do you build a drum tower?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0

26	Can you design a drum tower (gux louc) or do you know the architectural principle of it?	a. yes, I can design / I know the design principle very well	2
		b. yes, but not very well / it takes more practices	1
		c. no, I cannot / I don't know	0
27	Have you ever built a traditional pavilion (dingc)? If yes, how often do you build a traditional pavilion?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0
28	Can you design a traditional pavilion (dingc) or do you know the architectural principle of it?	a. yes, I can design / I know the design principle very well	2
		b. yes, but not very well / it takes more practices	1
		c. no, I cannot / I don' t know	0
29	Have you ever built a traditional lounge bridge (jiuc)? If yes, how often do you build a traditional lounge bridge?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0
30	Can you design a traditional lounge bridge (jiuc) or do you know the architectural principle of it?	a. yes, I can design / I know the design principle very well	2
		b. yes, but not very well / it takes more practices	1
		c. no, I cannot / I don' t know	0
Hunting and Fishing Skills (HF)			
31	Have you ever hunted (dos nyaenp)? If yes, how often do you hunt?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1

		c. no, I had never made traditional wine	0
32	Have you ever raised and trained a hound (kuap laeml)?	a. yes	1
		b. no	0
33	Is there any specific season (jiv) for hunting (dos nyaenpl)?	a. yes	1
		b. no	0
34	Have you ever fished (dos bal)? If yes, how often do you fish?	a. yes, I dye make traditional wine frequently	2
		b. yes, but I rarely make traditional wine	1
		c. no, I had never made traditional wine	0
Total Scores			60

국문 초록

산림전통지식의 보전에 관한 연구
- 중국 귀주성 Dengcen마을의 사례를 중심으로

수 세기 동안 지역주민들은 산림자원을 관리 및 이용하는 데에 있어서 전통지식에 많이 의지하여 왔다. 또한 그들의 전통지식은 산림생태계의 환경 서비스 공급 능력을 유지하여 주었다. 산림전통지식은 지역주민들의 생태학적 지식, 문화, 종교 신앙 그리고 산림 경영의 노하우를 포함한다. 이 산림전통지식은 선조들로부터 대대로 전하여 내려왔으나 산업화 및 과학의 발전 등으로 약화되어 현재 소실될 위기에 놓여있다. 본 연구는 산림전통지식의 보전 현황을 파악하고 산림전통지식 보전에 영향을 미치는 사회경제적 요소가 무엇인지 규명하고자 한다. 이러한 목적들을 위하여 중국 서남 지역인 귀주성에 위치한 Dengcen마을의 지역주민들이 보유하고 있는 산림전통지식의 활력을 환경적 전통지식의 활력 지수 측정법 (VITEK)을 통하여 측정하였다. 본 연구에서는 응답자의 나이, 성별, 도시지역 거주 경험, 그리고 교육 수준이 산림전통지식보전에 영향을 미치는 것으로 나타났다. 본 연구는 산림전통지식의 보전에 있어서 젊은 세대를 대상으로 하는 산림전통지식 교육 프로그램과 지역사회가 주도하는 문화 지향형 생태관광을 발전시키는 것이 필요하다고 제안하였다.

주요어: 전통지식, 토착지식, 산림 경영, 지역사회, 지역주민, 중국 서남 지역
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